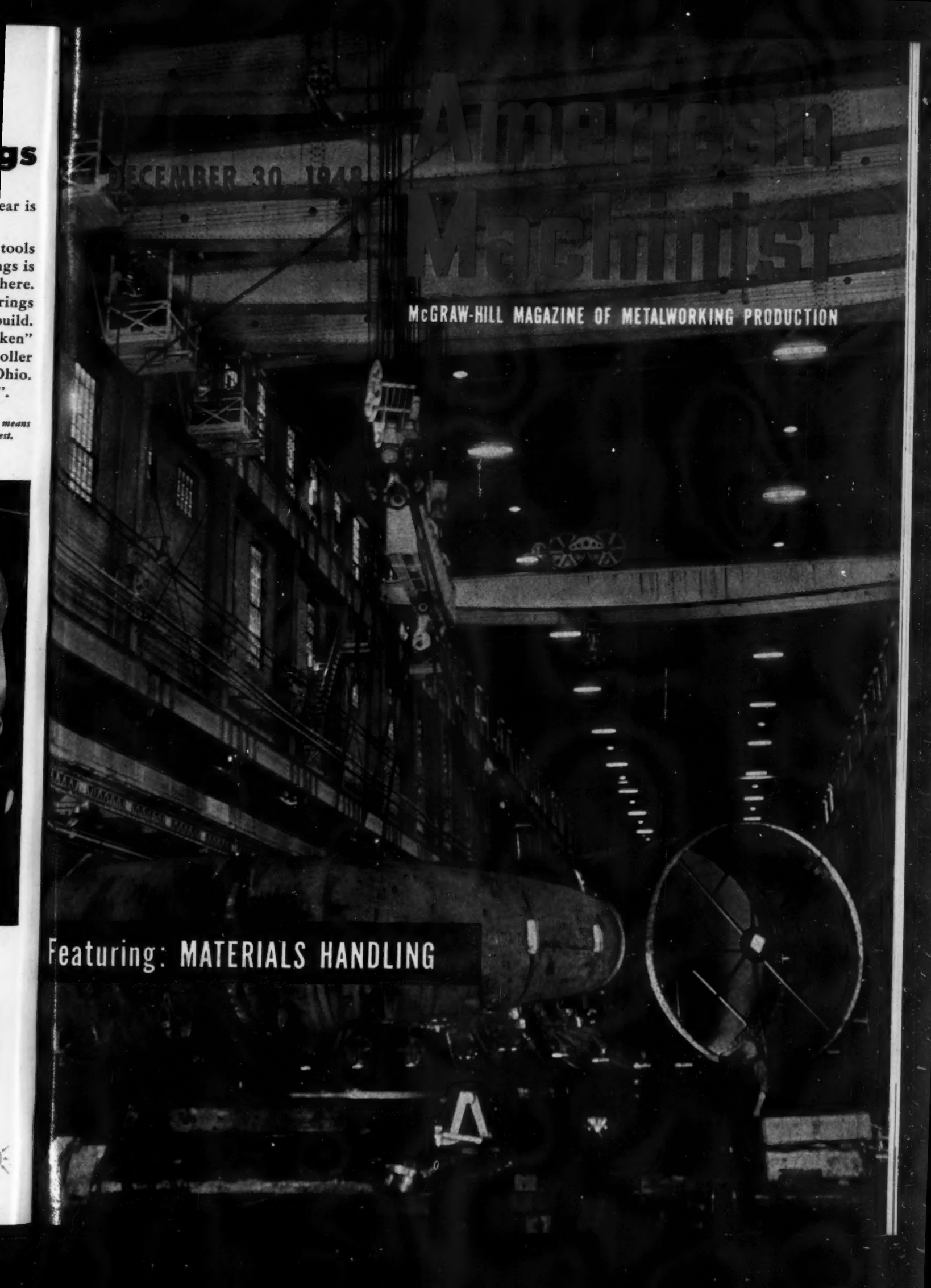

DECEMBER 30 1948
American Machinist
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION
Featuring: MATERIALS HANDLING

Compressor Blocks Now Finished

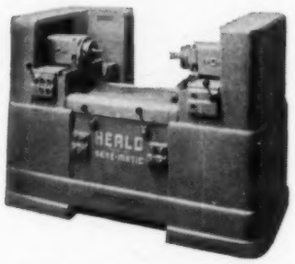
20% FASTER, and with HIGHER PRECISION

on a new Heald Model 222 Bore-Matic

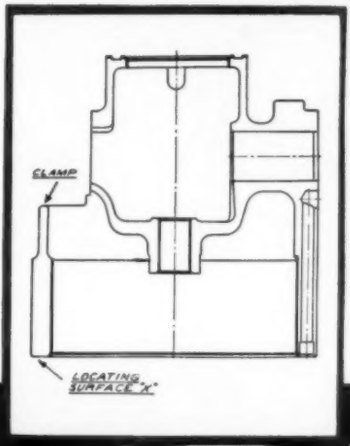
Here's a typical case where a new Heald machine meant more and better production at lower cost.

With this Heald Model 222 Bore-Matic, a manufacturer of compressor bodies has "upped" production 20%, improved product quality, and increased operator efficiency. Parts are now bored, faced and chamfered, two at a time, in a single automatic machine cycle. Faster indexing for greater cycle speed, constant feed hydraulic control for greater precision, and simplified loading and handling have made these savings possible.

Such results don't "just happen." They are the end product of years of research and engineering to produce a new line of Bore-Matics as well as Internal and Rotary Surface Grinders, which are especially designed for your present-day needs. So, whatever your precision finishing problems, why not get in touch with your nearest Heald representative. His job is to help you do your job better, and at lower cost.



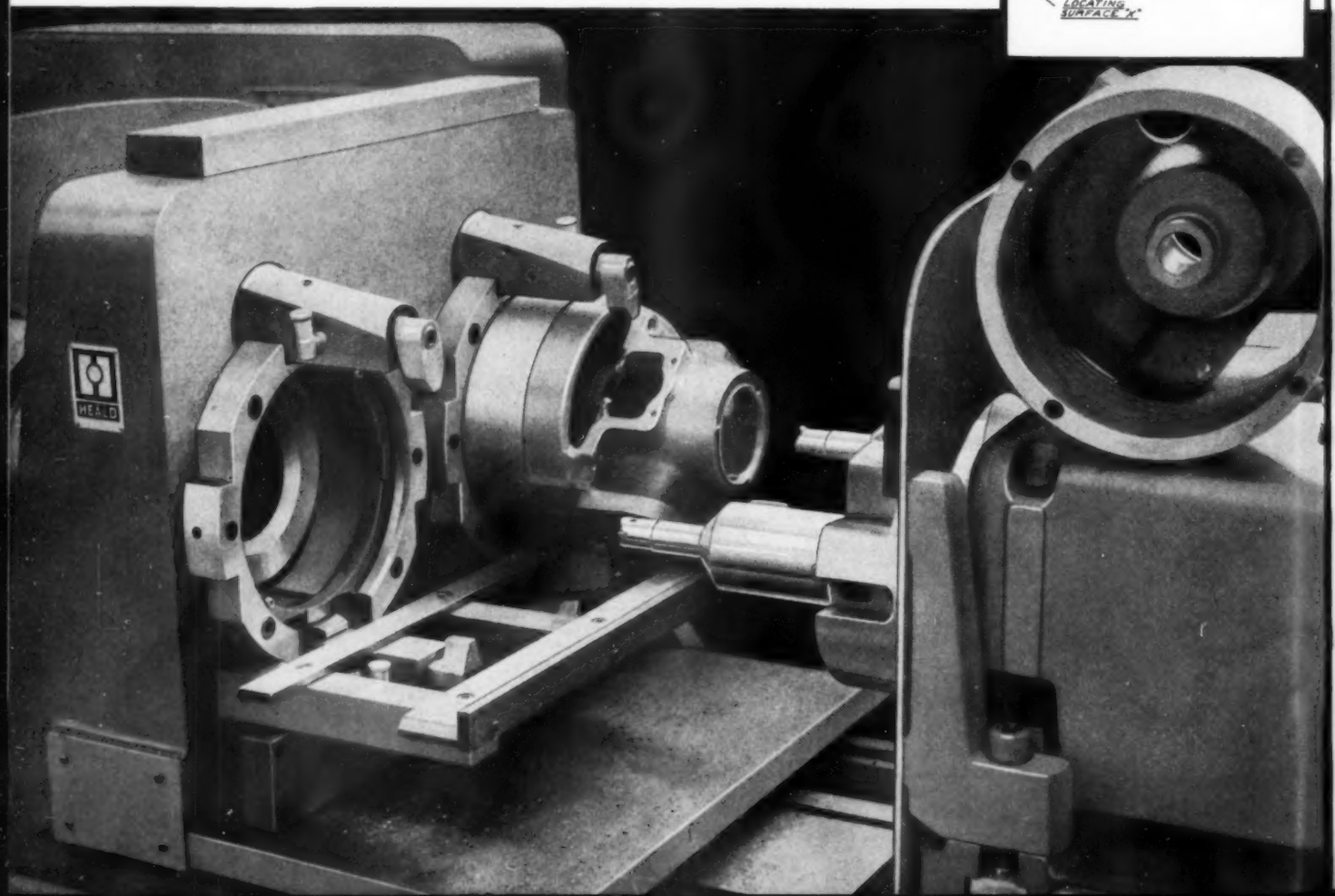
Increased production of compressor blocks is due to a faster operating, easier loading new Heald Model 222 Bore-Matic. Drawing below shows surfaces borized.



THE HEALD MACHINE COMPANY

Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton
Detroit • Indianapolis • Lansing • New York



TECHNOLOGY DEPARTMENT

PUBLIC LIBRARY
DEC 31 1948
DETROIT

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

BURNHAM FINNEY ..... Editor
E. J. TANGERMAN ..... Managing Editor

Associate Editors: RUPERT LE GRAND, BEN C. BROSHEER (Chicago), ANDERSON ASHBURN, H. E. LINSLEY, CHESTER S. RICKER (Detroit), J. J. McGUINNESS (News), MILES J. ROWAN

Assistant Editors: CHARLES D. EMERSON, EILEEN ERSHLER

SYDNEY OXBERRY ..... Art Director
RICHARD ROOMAN ..... Assistant
ANNE PALMER ..... Makeup

DEXTER KEEZER .. Director, Economics Dept.

JOHN CHAPMAN .... World News Director

GEORGE E. DOYING, JR. ..... Washington

FRED H. COLVIN ..... Editor Emeritus

ALBERT HAUPTLI, JR. ..... Publisher
WILLIAM E. KENNEDY ..... Asst. Publisher

District Managers: JOHN H. KOCH, M. A. WILLIAMSON, JR., Statler Building, Boston, Mass.; JAMES A. McGRAW, HUGH BRITTON, 330 W. 42nd St., New York 18, N. Y.; DAVID G. JONES, Architects Bldg., 17th & Sansom Sts., Philadelphia 3, Pa.; RAY DEEN, ANSON E MEANOR, 520 N. Michigan Ave., Chicago, Ill.; ADOLPH F. TISCHER, Hanna Bldg., Cleveland, O.; ROBERT H. ANDERSON, 1110 Delta Ave., Cincinnati, O.; PHILIP G. WEATHERBY, Penobscot Bldg., Detroit, Mich.; JOHN W. OTTERSON, 68 Post St., San Francisco, Calif., CARL DYSINGER, 621 So. Hope St., Los Angeles, Calif.; R. C. MAULTSBY, Rhodes-Haverty Bldg., Atlanta, Ga. Other offices: Continental Bldg., St. Louis, Mo.; National Press Bldg., Washington, D. C.; Oliver Bldg., Pittsburgh, Pa.; Aldwych House, Aldwych, London, W.C. 2.

Member of the Associated Business Papers and the Audit Bureau of Circulations.

COPYRIGHT 1948 by McGraw-Hill Publishing Company, Inc. All rights reserved.

Published every other Thursday. Price 35c per copy. Allow ten days for change of address. Subscription Rates: United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada, $6 for one year, $10 for two years, $12 for three years. Pan-American countries, $10 for one year, $16 for two years, $20 for three years. All other countries, $20 a year, $30 for two years, $40 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U.S.A. Return postage guaranteed.

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index.

CONTENTS FOR DECEMBER 30, 1948 ... VOL. 92, NO. 27

Cover ..... *Operation pictured is described on page 2*

ADMINISTRATION

Editorial ..... *Burnham Finney* 65
Employees Run Safety Program ..... *Victor Gruendler* 78
For High Wages, Full Employment ..... *J. H. McGraw, Jr.* 82
Visitor's Day ..... *Round Table* 114

ENGINEERING

Minimum Hub Diameters ..... *(RBS)* 129

SPECIAL REPORT

How Materials Handling Affects Plant Layout ..... *Miles J. Rowan* 83

MATERIALS HANDLING

Hotpoint Mechanizes Range Production ..... *Ben C. Brosheer* 67
Carrousel Assembles and Welds Large Dispenser Drums 80
Materials Handling Exposition 100
Show in Print 100
List of Exhibitors 111
Floor Plan 112
Horsepower for Overhead Chain Conveyors ..... *(RBS)* 125

INSPECTION AND FINISHING

Alarm Clock Starts Plating Tank Heat ..... *Bernard Levowich* 115
Light Gage Checks Recess ..... *John T. Holmquist* 116
Process Sheet for Sodium Hydride Descaling ..... *(RBS)* 127

MATERIAL CUTTING, FORMING

Continuous Press Foundations Simplify Layout ..... *J. T. Snedden* 71
Tapping Stud Cleans Holes ..... *W. G. McKay* 115
Reversed Shaper Tool Doesn't Dig In ..... *S. B. Rochey* 116
Old Shape Sets Up New Block for Shaping Job .. *Gustave Remacle* 116

TOOLING

Precision Dies Draw Brass Lock Parts ..... *Harold R. Nagle* 74
Shift Bar Controls Action of Floating Punches ..... *L. F. Stull* 115
Form-Tool Discussion ..... *Carl A. Johnson* 116

NEWS OF METALWORKING

Spot News 61
Gaging Metalworking 62
Detroit News 119
Names in the News 121

DEPARTMENTS

Talking Shop 99
Reference Book Sheets 125
Shop Equipment News 131
Parts and Materials 154
Round Table Discussions 160
Free Literature Available ... 164A

PUBLISHED BY McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42nd St., New York 18, N.Y.
Cables: "McGRAW-HILL, NewYork"

James H. McGraw (1860-1948), Founder; James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Executive Assistant for Publications; Nelson Bond, Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation

Chips and QUIPS

Our Cover . . . Three cranes cooperate to bring a 360,000-lb. welded spiral casing and speed ring from 40-ft. boring mill to erection floor at Allis-Chalmers Mfg. Co., Milwaukee. When assembled with runner and other parts, this will become the fifth hydraulic turbine at Shasta Dam on the Sacramento River, Calif., a 103,000-hp. unit to operate under 330-ft. head at 150 rpm. Shasta, next to the largest dam in the world (3500 ft. long and 460 ft. high max.), begun in 1928, did not go into operation until 1944. The first two turbines for Shasta were diverted to Grand Coulee to solve the Northwest power shortage during the war.

Our cover symbolizes the mechanical muscles which are so necessary in Metalworking because of the weight, size and complexity of workpieces, as well as the emphasis on cost reduction. Considering that a third or more of shop labor costs are represented by handling, this subject should be a major one in the mind of every production executive. We emphasize it here to remind you of the Third Materials Handling Show in Cleveland, Jan. 10-14; further emphasize it by a special report, two articles, a show preview and a list of exhibitors herewith.

Materials Handling 2 . . . "How Materials Handling Affects Plant Layout" is the subject of our current 16-page special report. An exhaustive study from a new angle, it explains the requirements in the layout to fulfill needs of the handling system, how to make a materials-handling survey, and gives two case studies—one of a new plant laid out for effective handling, the other of an older plant revised for more —efficient handling. Reprints are available, of course.

Materials Handling 3 . . . Hotpoint has just completed its new 1,000,000-sq. ft. electric-range plant, to produce 12,000 ranges a week. To do the job takes 7 miles of conveyors, automatic feeds and transfers, careful planning of workplaces, and so on. Associate Editor Brosheer pictures and describes the high spots in this issue.

Materials Handling 4 . . . Power and gravity conveying, plus an automatic-transfer mechanism, are included in the setup at the Indianapolis (Ind.) plant of F. L. Jacobs Company for welding up large Coco-Cola dispensers. The carrousel arrangement assembles and welds 40 drums an hour. Details of the tricks that make this possible are provided in a picture story in this issue.

Safety by the Saved . . . The interest and enthusiasm of the workers, essential in any successful safety program, are not easy to generate. Madison-Kipp Corp., realizing this, set up a safety program *operated by the 400 workers*. Results: accident frequency declined from 59% in 1943 to 12% in 1947. Five months were worked in 1947 without a single lost-time accident. Victor Gruendler, safety director, tells all.

$3,600,000 Postage . . . A Chinese subscriber sending in one of our New Literature postcards airmail, found $3,600,000 postage necessary. Another example of the value of American "know-how"—and of inflation.

Movable Presses . . . J. T. Snedden, plant engineer for Norris Stamping & Mfg. Co., describes the continuous press foundations in his job-lot press plant. Large presses can be moved in 24 hr. to provide straight-line production even on job lots. Sounds complicated, but isn't. For more about Mr. Snedden, see the biography below.

Coming . . . The first issue of *A.M.* in the new year, Jan. 13, will have a very diversified content. The special report will deal with "Surface Finish as a Tool," by Dr. Georg Schlesinger, giving latest practical results of research. Then there's an exclusive on first successful production of steel die castings, a discussion of the problems in turning tapered threads, an explanation of what to do and what not to do in resistance welding, an article on controlled atmospheres, and one on highspots in the new Kettering (Oldsmobile) Engine Plant.

CONSTRUCTOR . . . John T. Snedden, plant engineer for the Norris Stamping and Manufacturing Co. of Los Angeles, was born in Indiana. He moved to California when he was only six months old, so considers himself a native Californian. Mr. Snedden's schooling was taken in Southern California where he attended U.S.C.

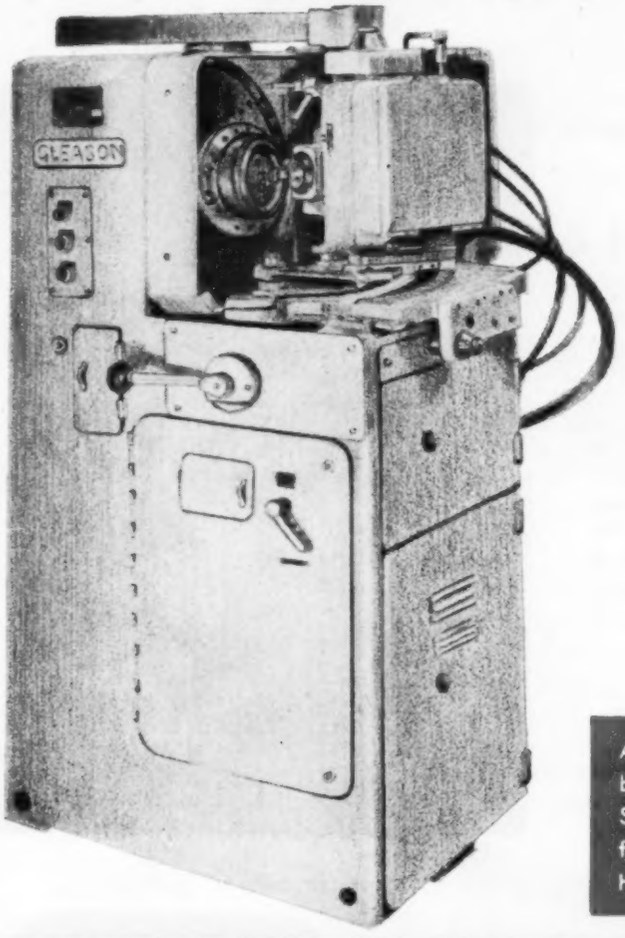
His experience previous to becoming associated with Norris included work on the 14-mile tunnel for the Department of Water & Power of Los Angeles; he was in charge of the electrical installation of Alcoa's 63-acre plant in Southern California; for Goodyear he was in charge of all electrical installations and engineering of the synthetic rubber plant; and was superintendent in charge of all marine electrical installations at California Shipbuilding & Dry Dock Company. His description of the continuous press-foundation system at Norris appears in this issue.

A GEAR CUTTING GENERATOR FOR THE SMALL BEVEL GEAR FIELD

GLEASON

No. 2 Hypoid Generator

SPIRAL BEVEL
ZEROL BEVEL
&
HYPOID GEARS



The latest addition to the small gear cutting field (for gears of 16 D.P. and finer) for production or jobbing is the new Gleason No. 2 Hypoid Generator. Closer control of actual cutting is provided on this machine, thereby making possible faster cutting time and a superior tooth bearing, accurately located. In most cases generated gears can be completed from the solid in one operation. In addition, this machine will produce curvic clutches and couplings and high reduction hypoid gears.

Additional equipment necessary to the smooth production of bevel gears and hypoids is the Gleason No. 7 Hypoid Cutter Sharpener which produces a high quality cutting edge and finish on the multi-blade circular cutters used on the No. 2 Hypoid Generators.

Gleason No. 7 Hypoid Cutter Sharpener

The No. 4 Angular Bevel Tester is employed to check the rolling qualities, tooth spacing and concentricity of small fine pitch bevel gears such as those cut on the No. 2 Hypoid Generator.

Gleason No. 4 Angular Bevel Tester

GLEASON *Works*
1000 University Avenue
Rochester 3, N. Y., U. S. A.

Builders of Bevel Gear Machinery for Over Eighty Years

Left: Dial Type Milling Machines have labor-aiding power speed and feed change. Built in Nos. 2, 3 and 4 sizes; medium and high speed ranges; plain, universal and vertical styles. Catalog M-1623-1.

Right: With one hand, and without walking or stretching, the entire range of speeds and feeds can be changed with this lever.

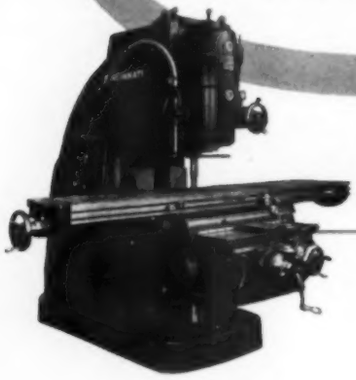
EASY DOES IT

or it may not get done at all

Who decides the purchase of new machine tools? If they're general-purpose types, the operator can give you many helpful suggestions. Ask him about changing speeds and feeds, for example. If it's easy to do, work which requires a change in feed and speed for a finish cut will get it. If it's difficult or out of reach, cutting efficiency and production usually run second. ¶ Labor-aiding features of CINCINNATI Dial Type Millers give the man at the machine a break . . . and give him a chance to run the machine at top performance. All Dial Types have these two big features of easy operation:

1. Power selection and changing of spindle speeds
2. Power selection and changing of feeds

These two features alone give Dial Type Milling Machines top rating with operators. And that goes a long way in reducing the cost of milling operations.



Left: High Power and Dual Power Dial Type Milling Machines have labor-aiding power speed and feed change. Built in Nos. 3, 4, 5 and 6 sizes; plain and vertical styles (also universal style for Nos. 3 and 4). Catalog M-1644 for High Power Dial Types; M-1647 for Dual Power Dial Types.

Right: With one hand, and without walking or stretching, the entire range of speeds and feeds can be changed with this lever.

THE CINCINNATI MILLING MACHINE CO.

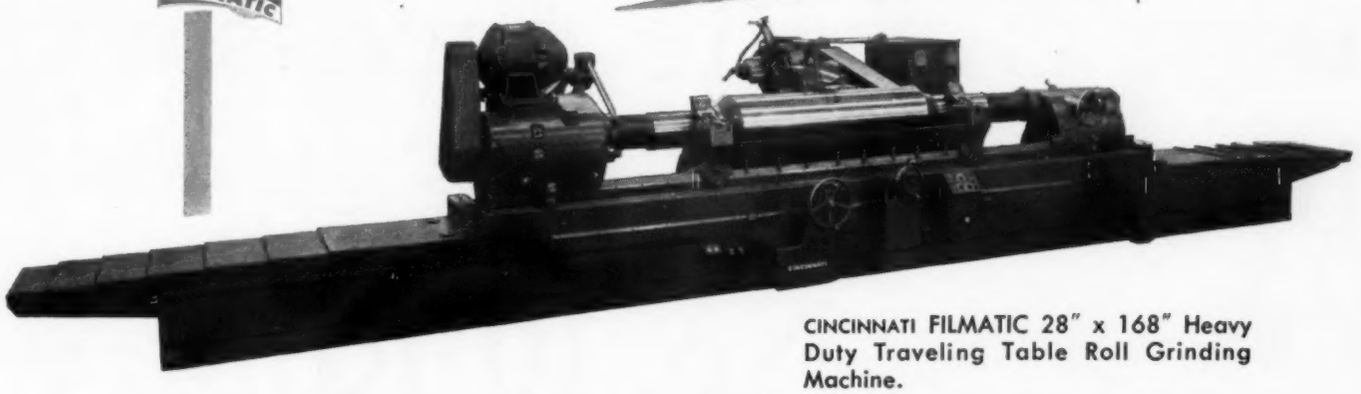
CINCINNATI 9, OHIO, U. S. A.

CINCINNATI

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

New Features of Cincinnati Filmatic Roll Grinders

SAVE HOURS OF TIME IN THE ROLL SHOP



CINCINNATI FILMATIC 28" x 168" Heavy Duty Traveling Table Roll Grinding Machine.

. . . and you can depend upon having rolls of high quality when you need them. Of the new CINCINNATI FILMATIC Traveling Table Roll Grinder's many features, just consider these two that give the machine the dependability of "Old Faithful."

FILMATIC grinding wheel spindle bearings. In 10 years, over 99% have required no time off for any reason whatever.

Circulating, filtered pressure lubricating system for the ways, with electrical pressure switch protection.

There are other features, too, that pay off in time saved and improved finish:

Automatic wheel balancing
Electronic table traverse

A new catalog, G-587, tells you all about these new CINCINNATI FILMATIC Roll Grinding Machines. A copy is yours for the asking.

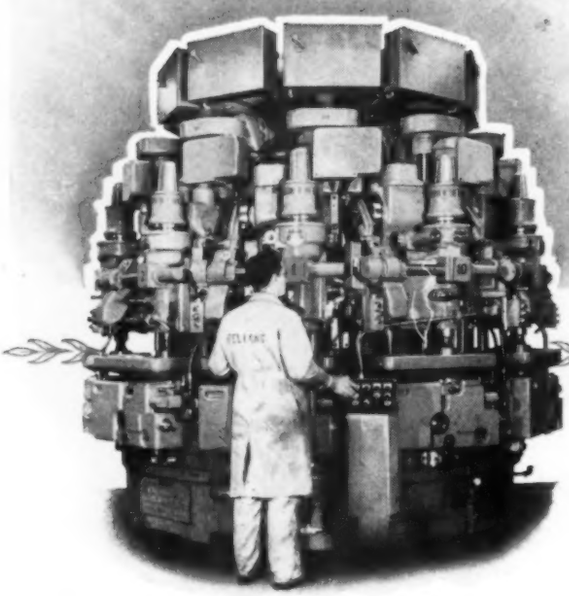
Close-up of operator at the machine, showing convenient grouping of operating controls and electrical push buttons.

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES

A complete revision of all previous concepts of low costs* in gear production is made necessary by the advent of the No. 10 Rotary Gear Shaper



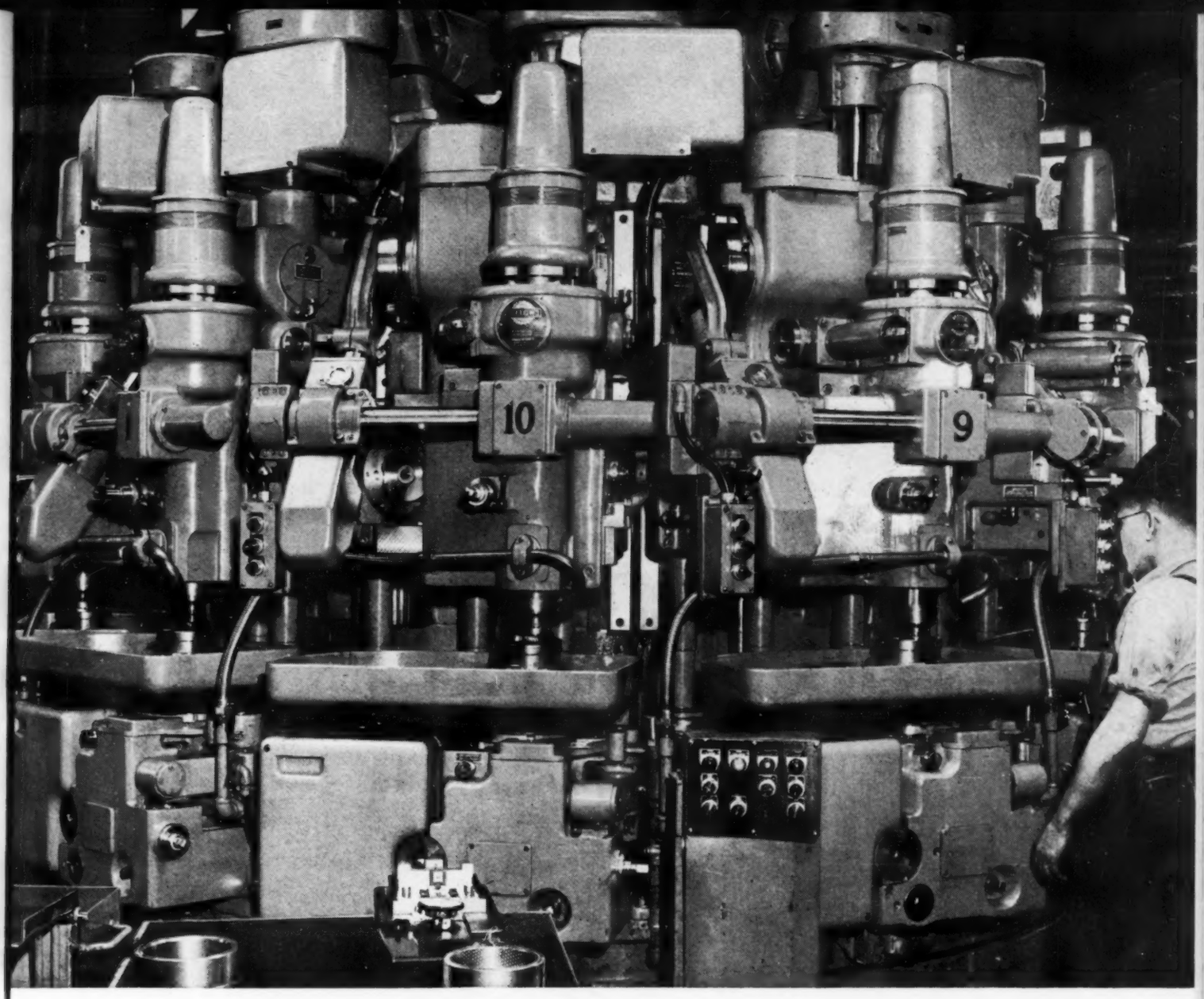
*New economies in every element of overall costs:
Cost of Equipment and Tools • Floor Space Required
Power Cost • Depreciation • Labor Needed.*

Fellows

THE FELLOWS GEAR SHAPER COMPANY

Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 7706 Empire State Bldg., New York 1.

GEAR SHAPERS • THREAD GENERATORS • CUTTERS • SHAVING AND BURNISHING MACHINES



A COMPLETED GEAR EVERY 50 SECONDS

Automatic-acting chucks enable operator to easily load and unload 74 pieces per hour.

As photographed, the Fellows No. 10 Rotary Gear Shaper is generating gears at a rate beyond every precedent. What is more; these are gears cut to precision limits, which the Gear Shaper principle alone makes possible. Here are the essential details on this typical job:

Internal helical gear	79 teeth
Material	fine-grade C. I.
Diametral pitch	16
Pitch diameter	5.1313 inches
Pressure angle	20°
Helix angle	15° 47′ 43″
Face width	1.25 inches

Automatic cycling, times the cutting for maximum speed. The cutter of each unit stops automatically at the top of the stroke as each unit approaches the unloading and loading position. But, the other 9 units keep right on working . . . A diaphragm-type chuck is used for holding the work, its automatic functioning being tied in with the rotation of the turret. Similar automatic holding devices are employed for other types of gear blanks . . . All in all, the work-producing capacity greatly outdistances all previous gear cutting machines, in low cost per machine hour, per man hour, per dollar invested, and per unit of space — or any other ingredient of cost. The difference is so remarkable that a re-evaluation of costs is in order for every mass-production gear job. Fellows engineers stand ready to collaborate with you in work ing out estimates on single gear, or multiple gear set-up combinations.

GEAR MEASURING AND INSPECTION INSTRUMENTS • PLASTICS MOLDING MACHINES

Van Norman

No. 36 TABLE: 58"X13"

Manufacturers in all types of industries step up milling production, minimize errors and cut costs per man- and machine-hour with Van Norman Ram Type Millers.

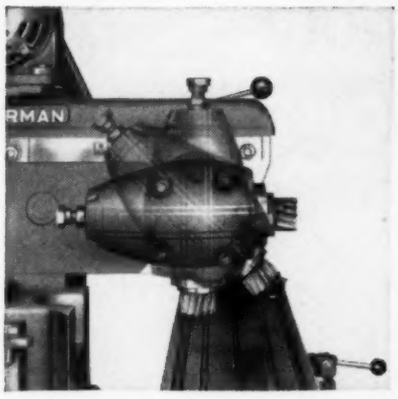
These versatile machines meet daily fluctuating milling requirements by enabling operators to perform horizontal, angular, or vertical milling, all with one machine. In addition, Van Norman Ram Type Millers cut idle operator and machine time as well as improve accuracy because most jobs can be carried through to completion in the original set-up. Other Van Norman advantages include front and rear *directional* control of all power feeds as well as six way rapid traverse, single lever feed selector, front and rear manual controls, heavy construction, massive cutterheads, anti-friction bearings and automatic lubrication.

See for yourself how these machines cut costs, improve accuracy and increase production in the toolroom, machine shop, experimental laboratory and pattern shop. Write: Van Norman Company, Springfield 7, Massachusetts.

RAM TYPE MILLERS

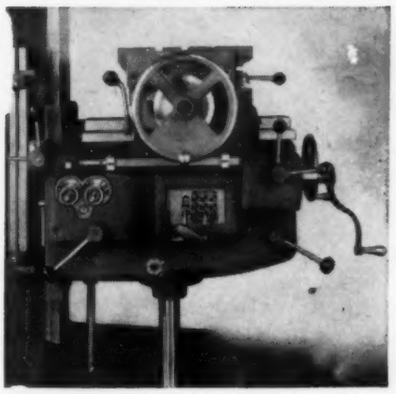
Meet Job to Job Requirements

Cut Idle Machine Time Up to 50%

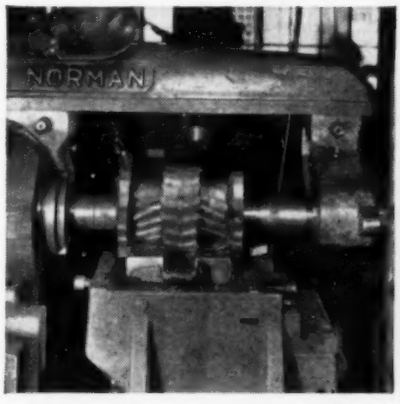


Adjustable cutterhead permits vertical, horizontal or angular milling . . . gives the work range of several single-purpose machines.

Adjustable cutterhead and movable ram in combination with the saddle crossfeed provide maximum versatility. (Subhead mounted on cutterhead.)

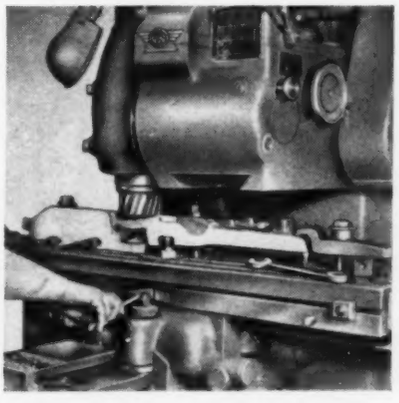


Front and rear control of hand and power feeds give complete visibility and control of operations from either location. Reduces worker fatigue.



Horizontal milling setup. The ram-type overarm with dovetail ways and outer support assures rigidity and accuracy.

With head locked in angular position the operator is taking an angular cut and operates the miller with rear controls.



The ram-type miller used with adjustable cutterhead in the vertical milling position . . . operator using front controls.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

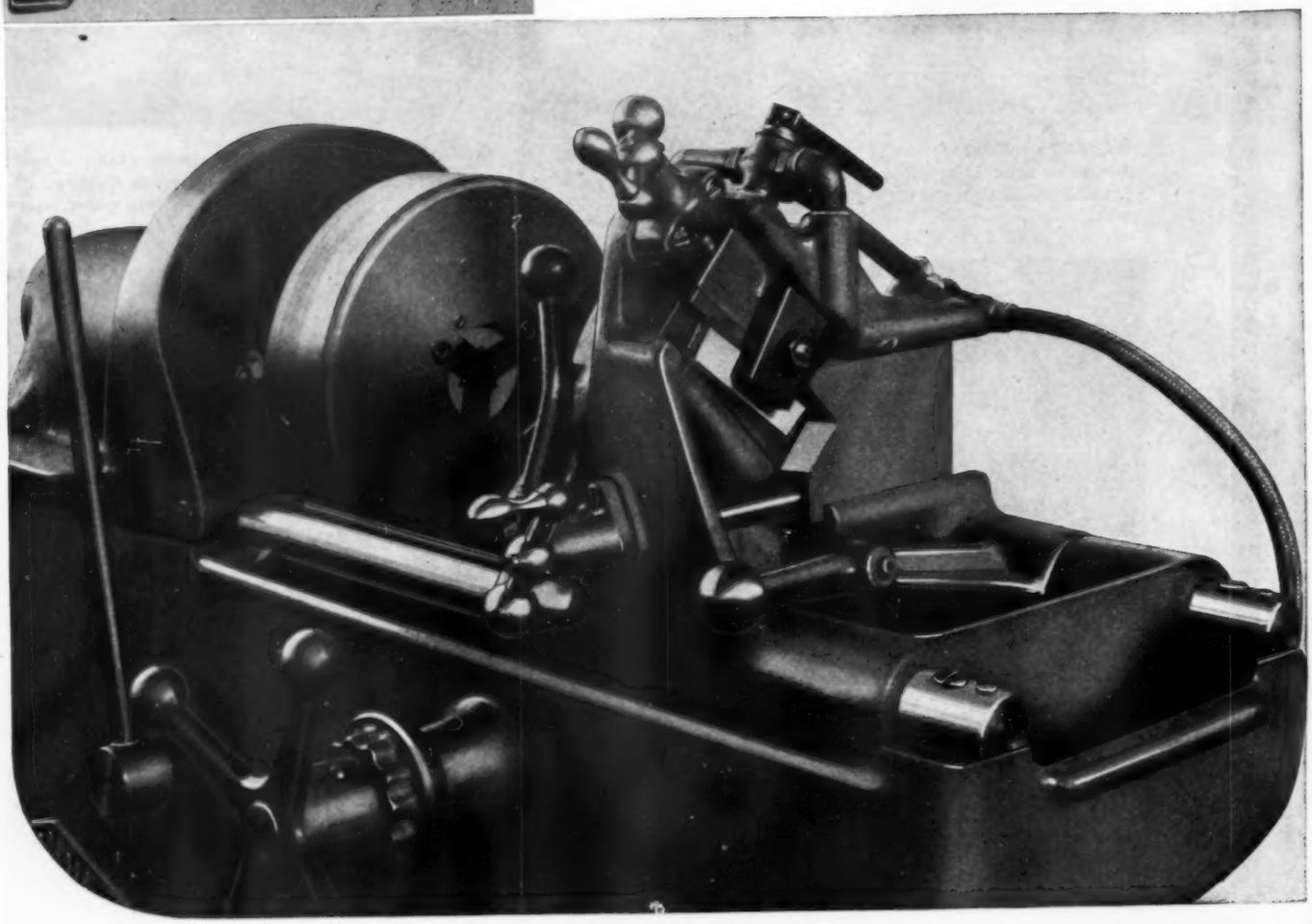
"It Pays to Van Normanize"

The LITTLE LANDIS

For **MAINTENANCE**

and

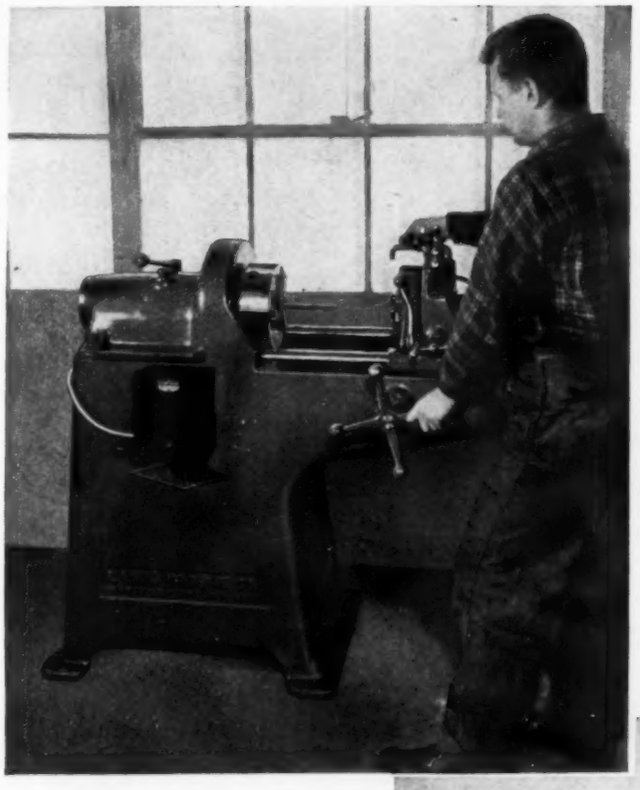
JOBBING



LANDIS
REG. U.S. TRADE — MARK PAT. OFF.

LANDIS

Pipe Threading & Cutting Machine



• The LITTLE LANDIS Pipe Threading and Cutting Machine is designed for threading bolts and for cutting off and threading pipe in jobbing and maintenance shops. In the illustrations on this page, the 2" LITTLE LANDIS is producing bolt threads for use in maintenance work.

The LITTLE LANDIS can handle a variety of work at a minimum cost, permit the quickest possible set-up changes, and produce cleanly-cut and well-formed threads on all materials. It uses the Landis Chaser, the only pipe threading die with the same free-cutting action and natural clearance of a lathe tool. This allows for long life between chaser grindings and smooth finish and accuracy in the finished thread.

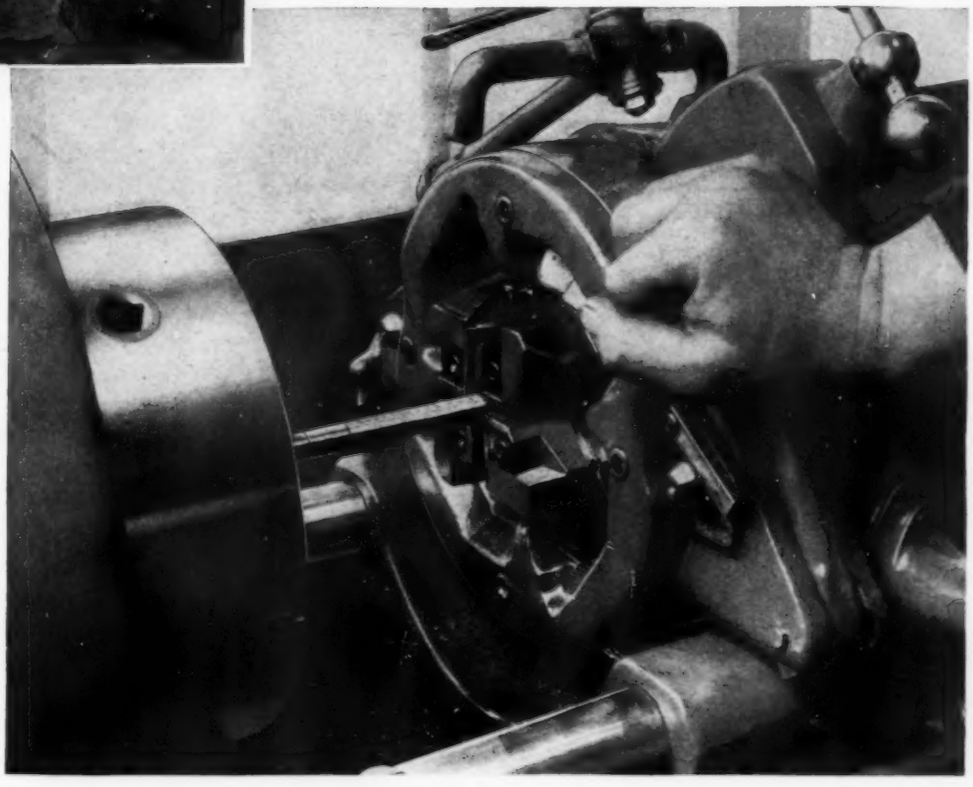
Write for Bulletin C-82

FOR QUICK SET-UP CHANGES...

The 3/4" and 2" Landis Stationary Die Heads, standard equipment with the LITTLE LANDIS, give rapid flexibility in cutting pipe threads within a range of 1/4" to 2" and bolt threads 1/4" to 1 1/4" or 3/8" to 1 1/2".

The die heads are supported on the cross rail and locked securely in position by a latch. They are readily interchanged in a few seconds.

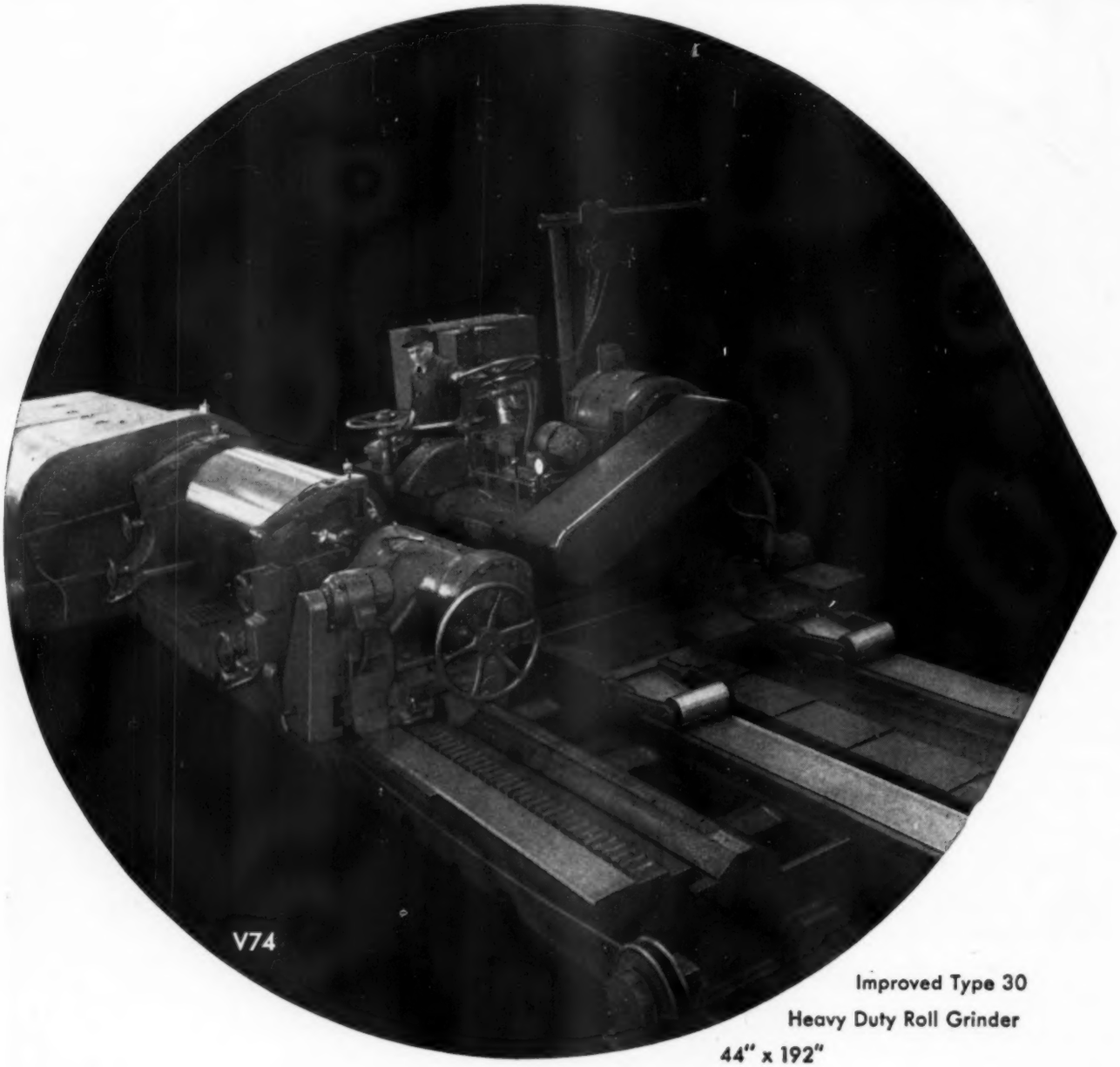
The Stationary Die Heads are quick-opening, with opening and closing controlled through a lever on the side of the head. Size adjustment is universal, made through a self-locking hand-wheel.



MACHINE CO. WAYNESBORO PENNA. U.S.A.

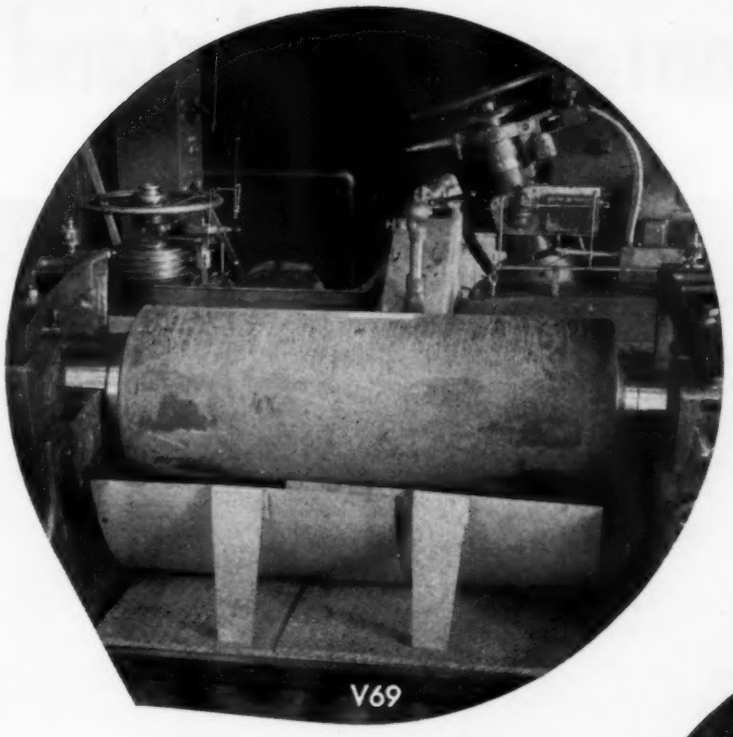
FASTER–more accurate roll grinding

grinding from rough in one operation/saves 14 hours per roll



Improved Type 30
Heavy Duty Roll Grinder
44" x 192"

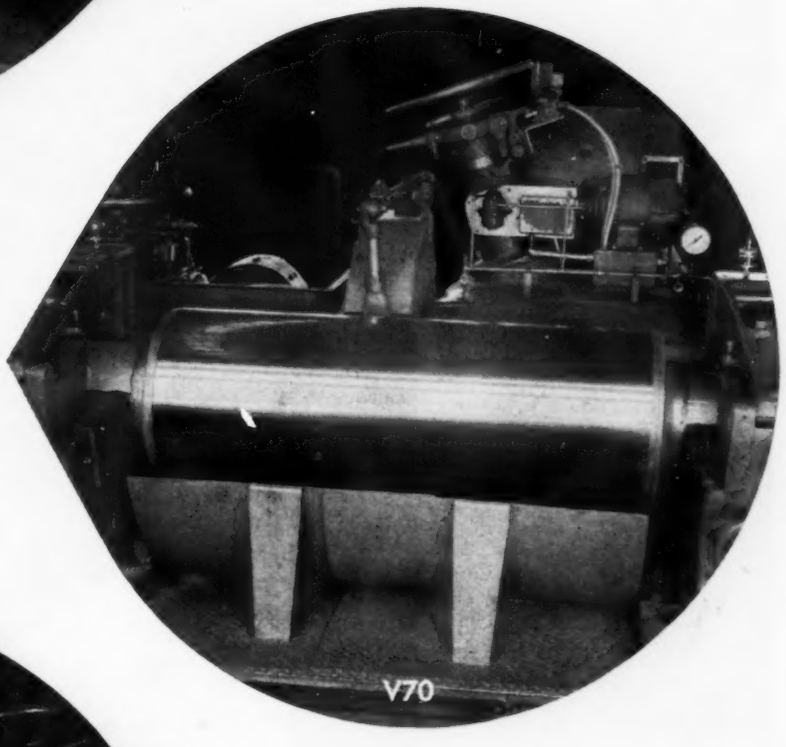
LANDIS TOOL
Precision Grinders



V69

save 14 hours per roll

before	2½ days turning and finish grinding.
now	Grinding from rough, 6 hours, one operation.



V70

for grinding all types of rolls

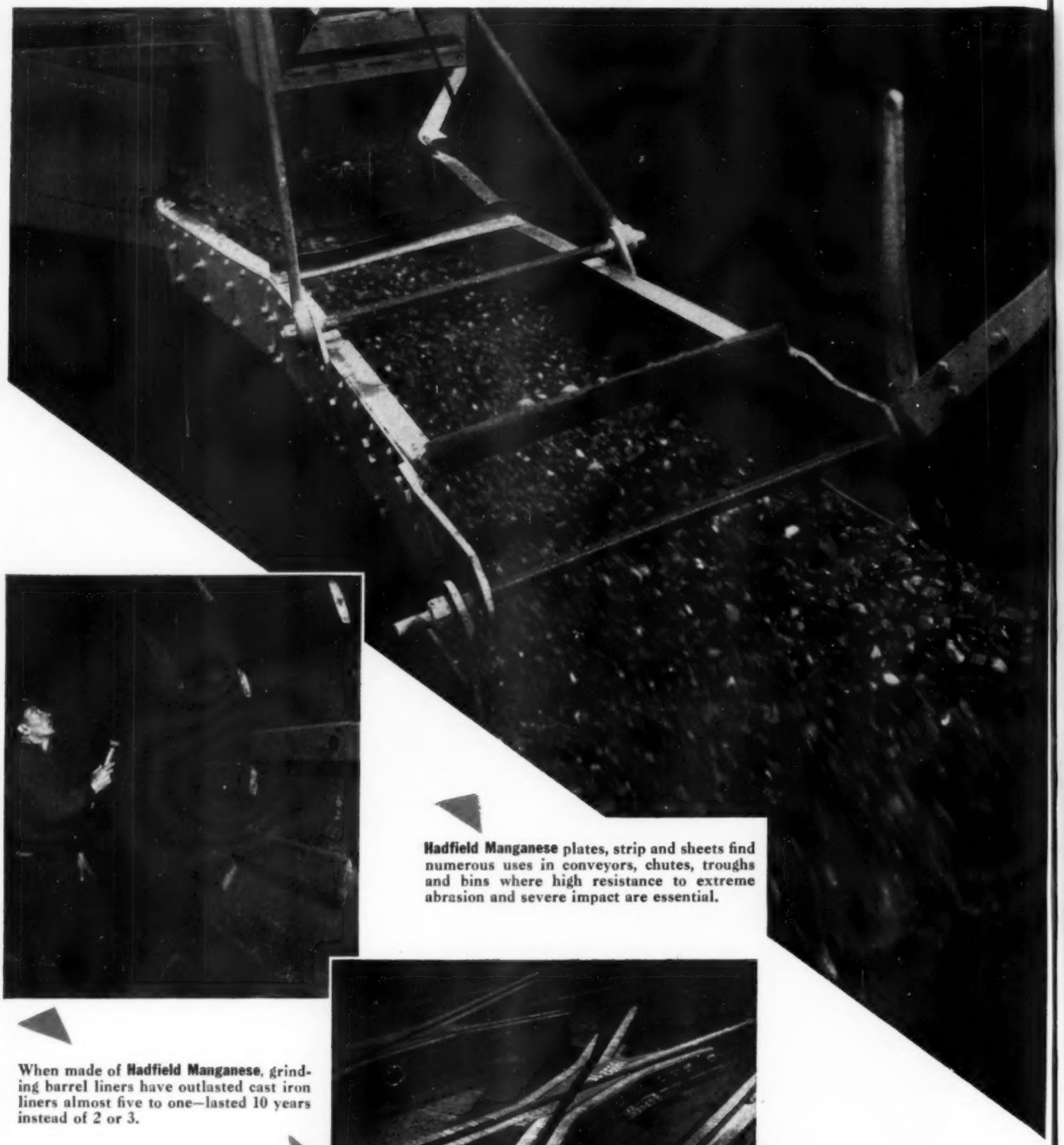
size	19" to 45" diameter by 24" to 120" length of body, weighing 4100 to 81,000 lbs.
materials	Nickel, chromium and molybdenum alloy steel and alloy iron.
shapes	Straight, crowned, concaved, taper (for necks)
types	Slabbing, broadside, back-up, hot, cold, sheet, plate.

J72

Controls Convenient for Operator

LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

If your equipment must withstand



Hadfield Manganese plates, strip and sheets find numerous uses in conveyors, chutes, troughs and bins where high resistance to extreme abrasion and severe impact are essential.

When made of **Hadfield Manganese**, grinding barrel liners have outlasted cast iron liners almost five to one—lasted 10 years instead of 2 or 3.

The ability of **Hadfield Manganese** to increase in hardness under repeated impact is illustrated by its use in railway frogs, in which, after service, the hardness of the wearing surface of the frog has shown an increase from original hardness of 185 Bhn to 495 Bhn.

severe abrasion and heavy impact

—prolong its life with

HADFIELD MANGANESE Steel

SOMEONE has very aptly described Hadfield Manganese as *"the steel that gets better the harder you use it."* And it's true. For this wear-resistant Alloy Steel has the unusual characteristic of markedly work-hardening under impact and as a result actually becomes more and more wear-resistant in service.

This desirable characteristic of Hadfield Manganese Steel pays off BIG in increasing service life of such equipment as chutes, bins, screens, tumbling barrels, and other applications where hard usage and impact abrasion are encountered.

For example: In stamp mill shoes operating at 1500 ft. lb. blows, 100 to the minute, Hadfield Manganese Steel has outworn by 25% the next best of eleven alloy steels tested. In rock crusher jaws it shows only 1/10 the rate of wear of chromium steel; 1/17 the rate of wear of carbon steel.

Because Hadfield Manganese Steel is probably unsurpassed in its ability to work-harden—being superior in this respect even to austenitic stainless steels—it offers further important advantages in metal-to-metal contact applications. In either the wrought or cast form these advantages are outstanding. In sheaves, rails, and castings for railway crossings, frogs and switches, etc., where compressive loads or impact operate, Hadfield Manganese Steel develops a smooth, very hard surface that strongly resists wear—but does not abrade the contacting part.

Hadfield Manganese Steel has outstanding toughness even at low temperatures. At minus 100°F. it retains from 50% to 85% of its room temperature impact resistance. Thus it provides a valuable safety factor when used in appropriate applications which must operate at sub-zero temperatures or in Arctic climates.

Also Possesses Desirable Electrical Properties

From an entirely different angle, Hadfield Manganese Steel is of interest to manufacturers of electrical equipment. In the austenitic condition, Hadfield Manganese Steel possesses desirable non-magnetic properties. Fabricators will find its use for shielding undesirable stray currents and magnetic fields an important feature. Such applications as switchboard panels, conduits, lifting magnets, and transformer parts are a few of the many applications in this field.

• • •

We have been producing U·S·S Hadfield Manganese Steel for many years. Our engineers and metallurgists have pioneered its use in many applications. In railway equipment and track work. In electrical equipment. In the aggregate industry. In oil-well drilling. In the manufacture of cement and clay equipment. In the mining, construction, and quarrying industries.

If we can be of any help in applying this superior steel to your designs, call on us. Our experience is at your service.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST TO COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH

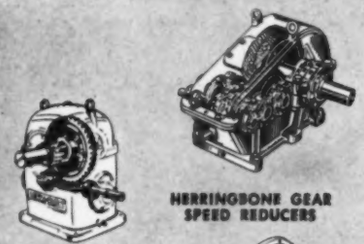
COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

USS

8-1616

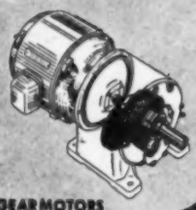
UNITED STATES STEEL

THE COMPLETE LINE OF
LINK-BELT
POWER TRANSMISSION
MACHINERY


HERRINGBONE GEAR SPEED REDUCERS

WORM GEAR SPEED REDUCERS

HELICAL GEAR SPEED REDUCERS


GEARMOTORS

ELECTROFLUID DRIVES

P.I.V. GEAR SPEED VARIATORS

SILVERLINK ROLLER CHAIN DRIVES

SILENT CHAIN DRIVES

STEEL AND MALLEABLE CHAIN DRIVES

V-BELT DRIVES

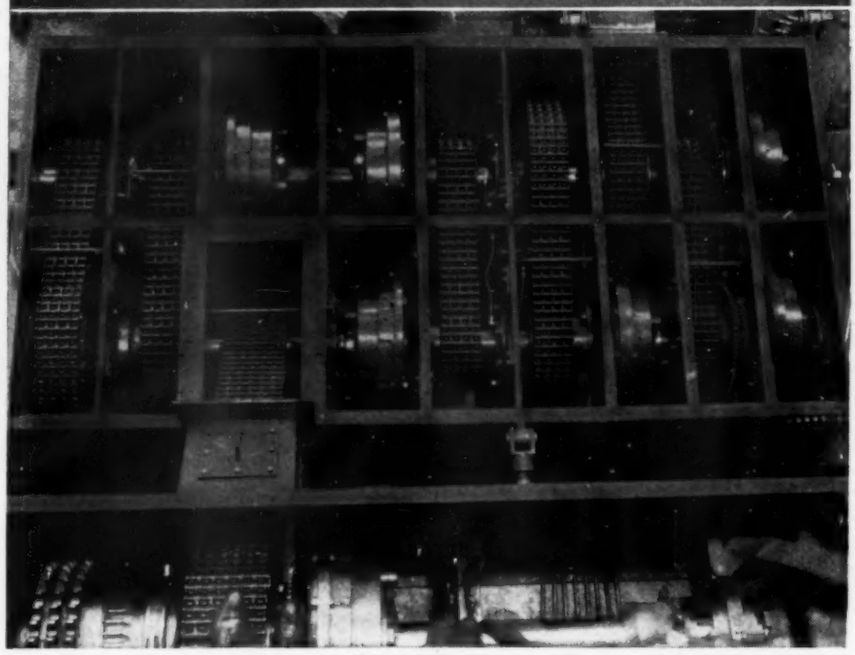
UNMOUNTED BALL AND ROLLER BEARING UNITS

ROLLER BEARING MOUNTED UNITS

BALL BEARING MOUNTED UNITS

BABBITTED BEARINGS

For Efficiency . . . and Long Life . . .



LINK-BELT *Silverlink* ROLLER CHAIN

Performance on every type of equipment and in every industry proves the high quality of Link-Belt Silverlink Roller Chain, incorporating the "know-how" of the world's leading producer of chain. Great strength in relation to weight, stamina to withstand shock loads, and smooth, positive, flexible operation are reasons for choosing Link-Belt Silverlink for the widest variety of conveying and power transmission functions.

It assures positive application of power which means perfect timing and coordination of machine operations. Shafts in any number, in any arrangement, can be given either direction of rotation, on long or short centers.

From the smallest size to the largest, it is a precision product. Furnished to manufacturers' (A.S.A.) standard sizes in single and multiple widths, to meet all requirements.

Let Link-Belt chain specialists aid you in applying Link-Belt Silverlink, where efficiency and long life count, for power transmission or conveying.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Offices, Factory Branch Stores and Distributors in Principal Cities.

10,959

LINK-BELT

Power Transmission Machinery

Turn your difficult milling problems into routine production jobs

NEWTON DRUM TYPE MILLING MACHINES

Built to speed up rough and finish duplex milling, Newton Drum Type Milling Machines are cutting costs on the production lines of leading automobile, truck, tractor, and other industrial plants. Outstanding among their cost reducing features is the versatile unit head construction that makes possible head relocation to suit other parts when model changes are made. Carbide cutters are regularly used on these machines.

The Newton Drum Type Milling Machine shown here is designed for fast, accurate rough and finish milling of both top and gasket faces of cylinder heads at one pass.

Full information covering Newton Drum Type or other of the many types of Newton Milling Machines will be furnished upon request

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

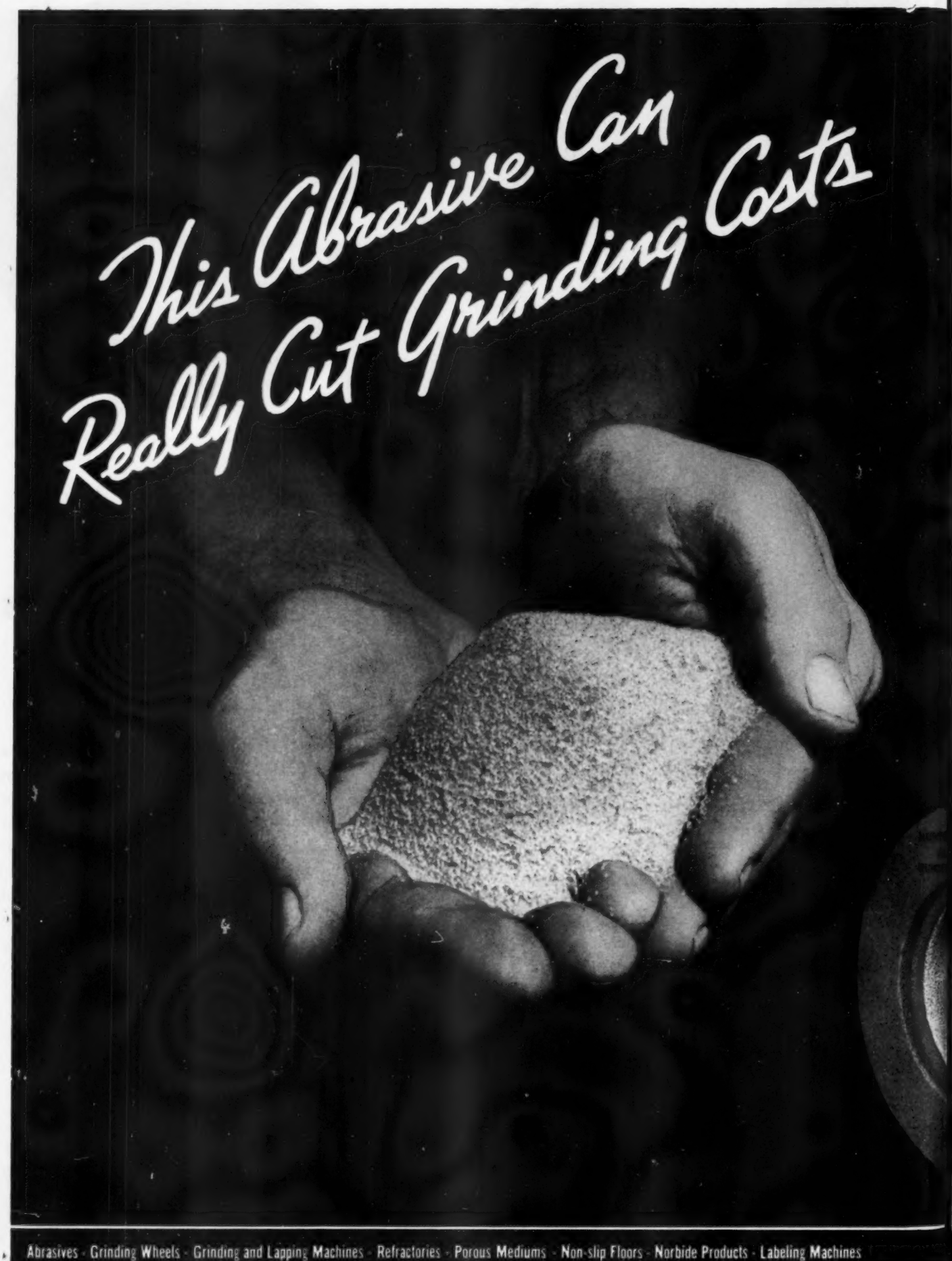
BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK



Abrasives - Grinding Wheels - Grinding and Lapping Machines - Refractories - Porous Mediums - Non-slip Floors - Norbide Products - Labeling Machines

. . . It's 32 ALUNDUM®

The Sensational Norton Development

Cuts Faster—Cuts Cooler

32 ALUNDUM abrasive is entirely different from any other abrasive—made differently by a unique Norton-developed process. *There's no crushing to size*—each grain forms in the electric furnace as a single, complete, multi-pointed crystal. The result is a grinding wheel that's *sharper*—that cuts faster and cooler.

Fewer Dressings—Longer Wheel Life

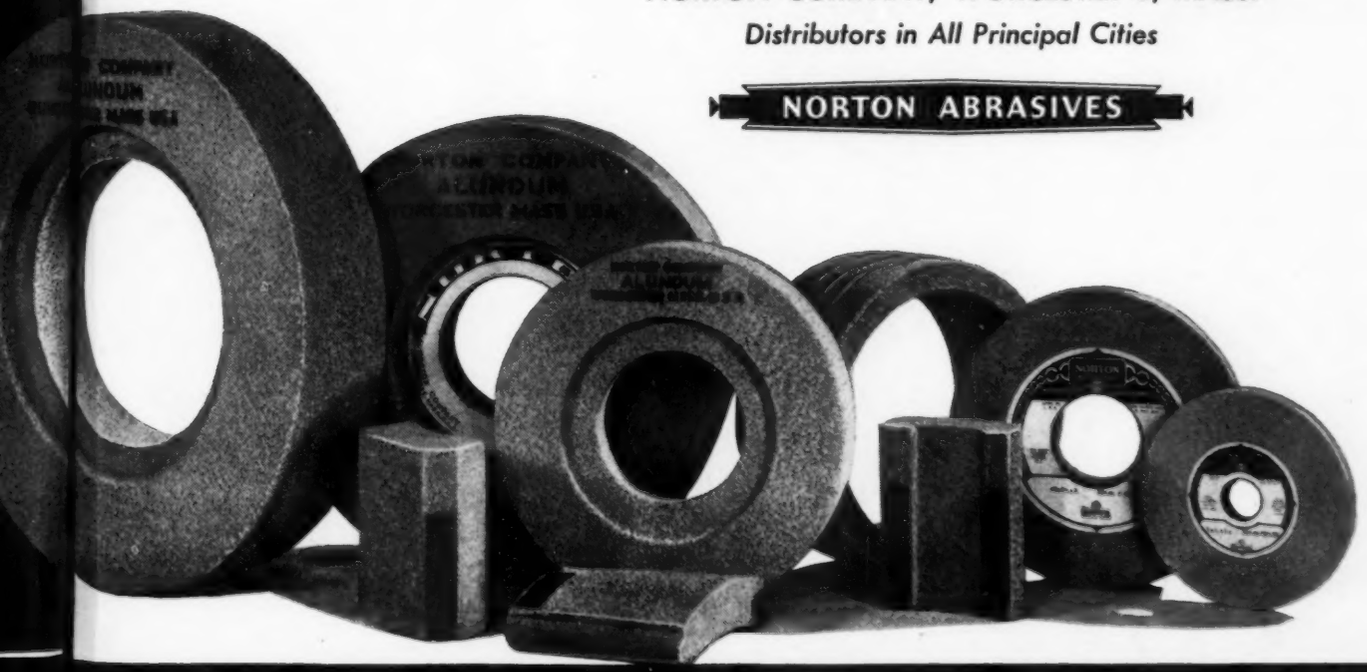
The grains of 32 ALUNDUM abrasive are over 99% pure fused alumina—no non-cutting slag or pores. This means grains with *greater resistance to dulling*—resulting in fewer wheel dressings, longer wheel life.

The cost-cutting ability of 32 ALUNDUM grinding wheels has been definitely proved—by steadily increasing use in thousands of plants. *They can cut costs for you, too.* Try them for cylindrical, centerless, surface, gear, tool and internal grinding. Ask your Norton abrasive engineer or Norton distributor for specific recommendations for your jobs.

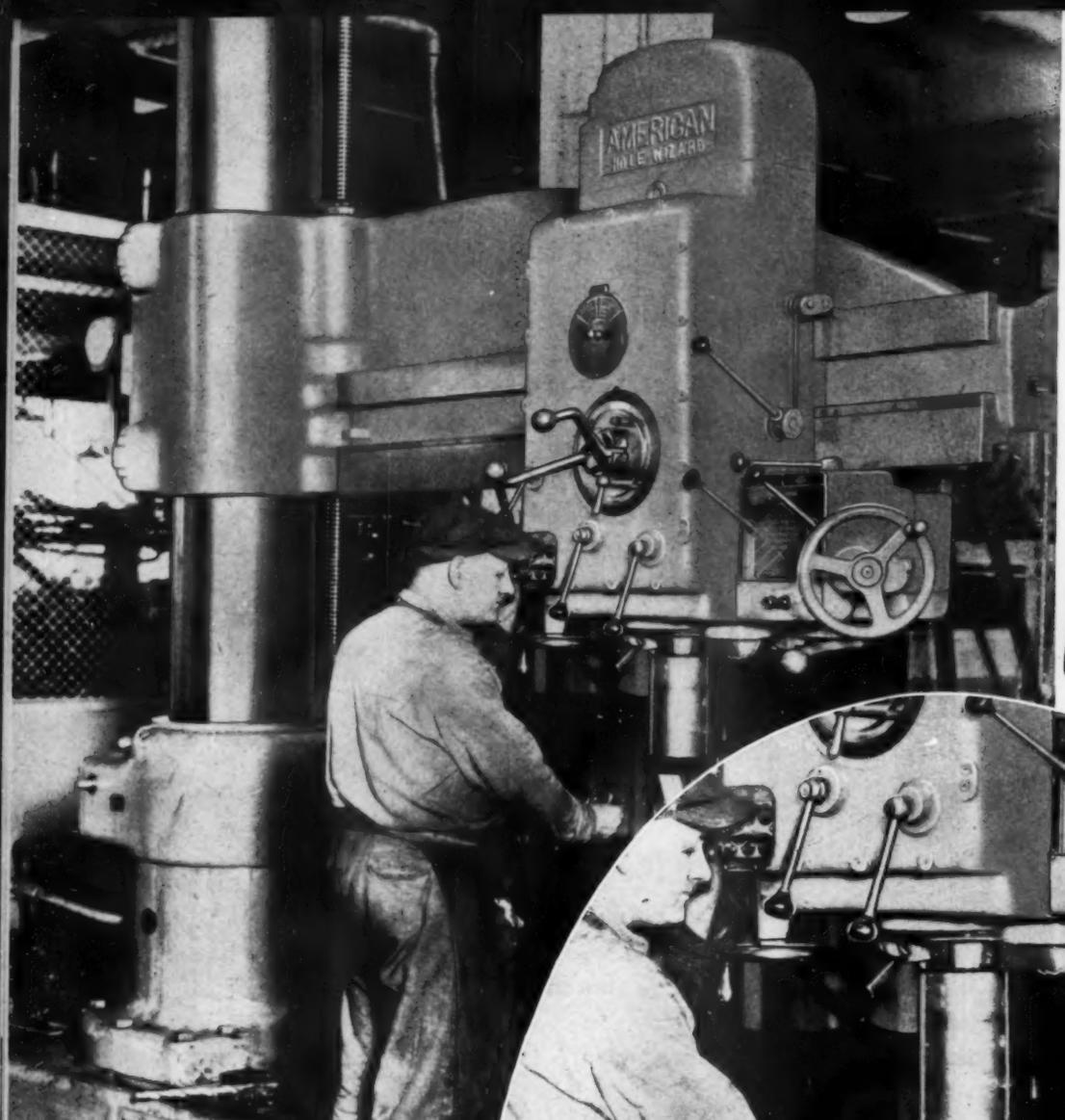
NORTON COMPANY, WORCESTER 6, MASS.

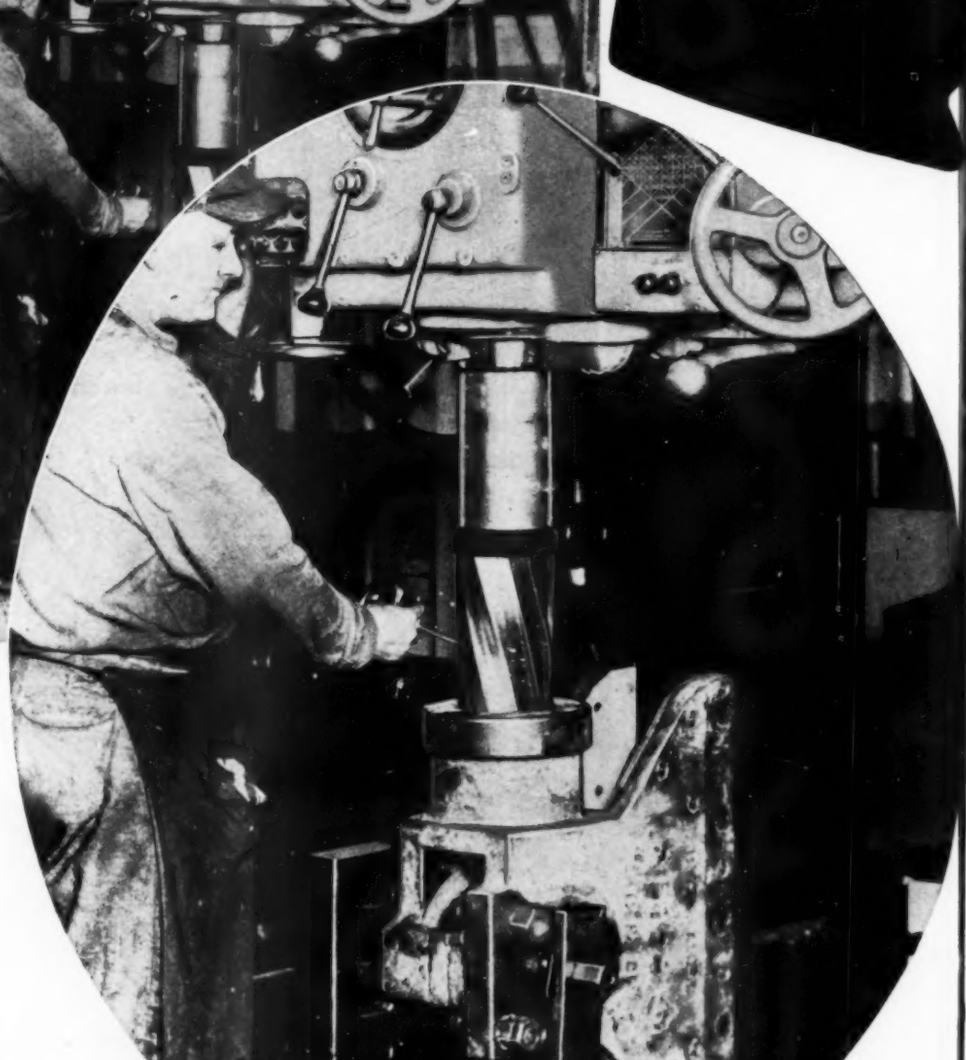
Distributors in All Principal Cities

NORTON ABRASIVES



NORTON COMPANY, WORCESTER, MASS., New York, Chicago, Detroit, Cleveland, Philadelphia, Pittsburgh, Hartford, Denver, Los Angeles





Taper reaming locomotive cross heads for piston rod fits.

Courtesy of
The Chesapeake and Ohio
Railway Co.

THE AMERICAN TOOL WORKS CO.

The Acid Test of SPINDLE CONSTRUCTION

Reaming cross heads for piston rod fits is about the toughest job you can find for a radial drill spindle.

This work must be done at slow speeds, without chatter and with a fine finish.

IT'S A TOUGH ONE BUT—

1 **The boring mill construction of the "American" Hole Wizard Spindle does the job. Its 100% anti-friction design with adjustment for wear insures frictionless operation and maintenance of original accuracy.**

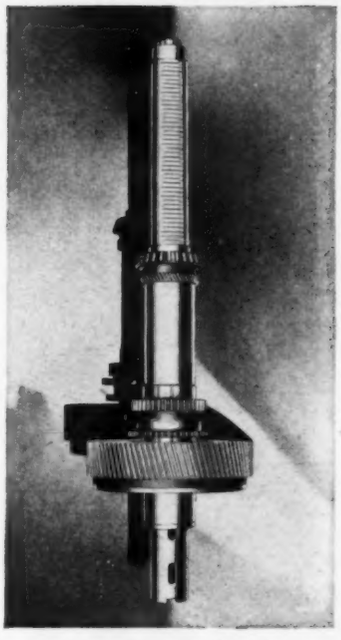
2 **The patented Double Lo-Hung Spindle Drive locates the large diameter driving gear at the bottom of the head close to the work, thus minimizing spindle torque.**

3 **The large diameter spindle, recently increased to add 37% to its rigidity, easily resists the enormous torsional effort imposed by this job.**

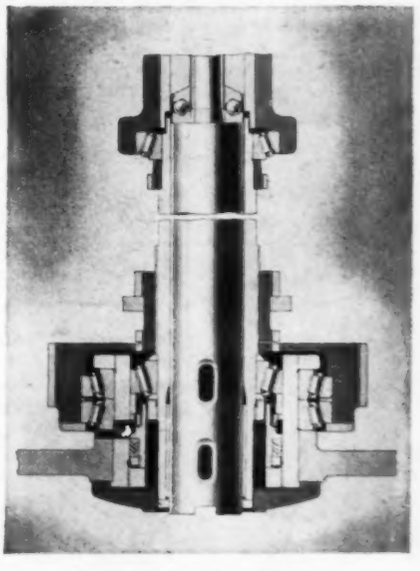
4 **Spindle shake is reduced to an absolute minimum by allowing only .00025" freedom between the ground nitrided spindle and the honed nitrided spindle sleeve. This is especially valuable on accurate boring operations.**

These four spindle characteristics are YOUR assurance that YOUR tough ones will be done easier, quicker and cheaper with an "American" Hole Wizard on the job.

Civilian goods and services must be produced in greater quantities and at lower costs. The "American" Hole Wizard Radial definitely is a contributor to this cause.



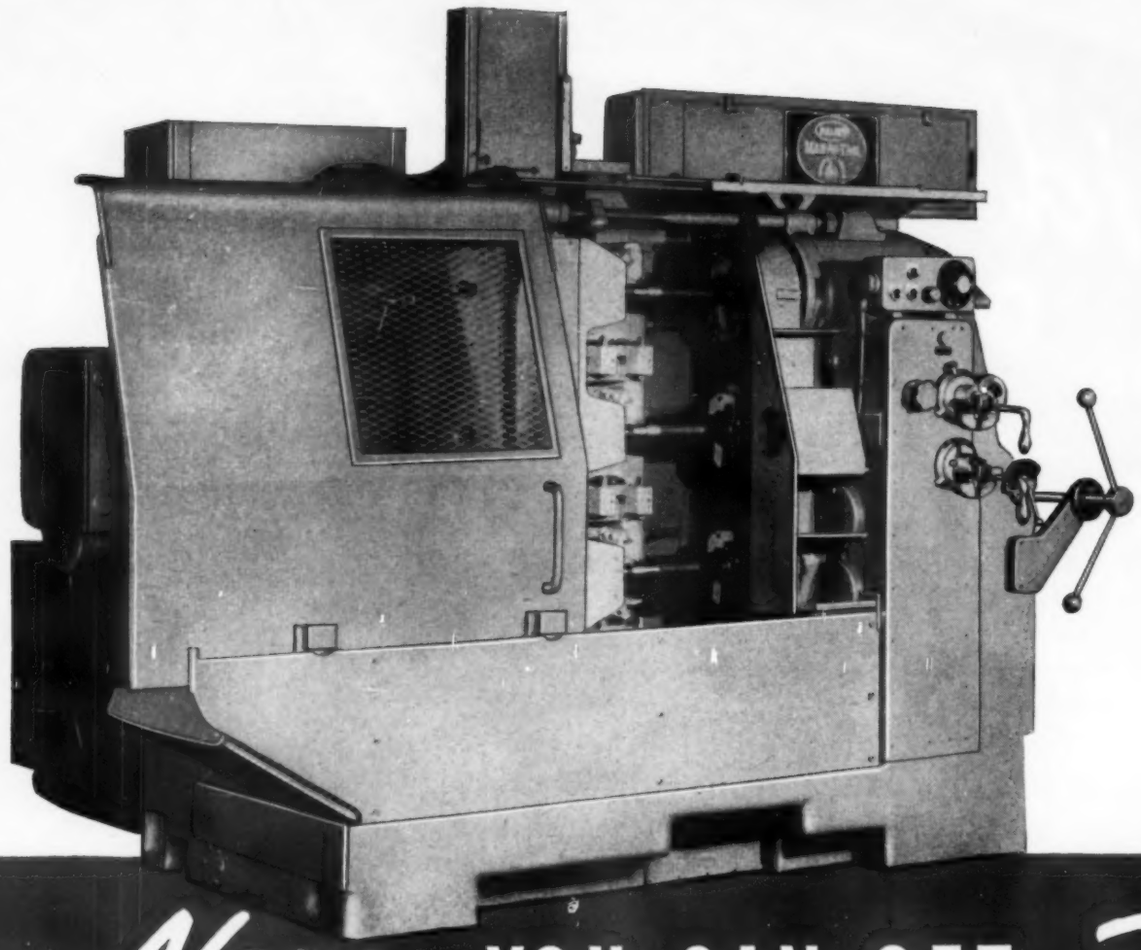
Patented Double Lo-Hung Spindle Drive.



Patented Double Lo-Hung anti-friction spindle mounting.

BULLETIN 327 TELLS THE STORY . . . YOURS FOR THE ASKING

Lathes and Radial Drills **Cincinnati, Ohio U.S.A.**



Now... YOU CAN GET 3 IN LESS TIME THAN IS OFTEN

These 8 Production Reports May Suggest Big Savings For YOU

Number	Part	Material	3 Pcs. Floor to Floor Time	Time per Piece
1	Third motion shaft	Steel Forging	2.21 min.	44 sec.
2	Overdrive main shaft	SAE 4620	1.96 min.	39 sec.
3	Crankshaft	Steel Casting	2.25 min.	45 sec.
4	Sector Shaft	SAE 5132	.8 min.	15 sec.
5	Counter Shaft	SAE 4320	1st chg. 1.78 min. 2nd chg. 1.63 min.	36 sec.—1st chuck 32.6 sec.—2nd chuck
6	Inner axle Shaft	SAE 4140	1.62 min.	32 sec.
7	Outer race Bell	SAE 4620	2.0 min.	40 sec.
8	Rear axle Shaft	SAE 8630H Forge	2.30 min.	46 sec.

BULLARD CREATES ***NEW METHODS*** TO MAKE

Model 30H Man-Au-Trol Horizontal Lathe Produces 3 Identical Pieces per Cycle

Model 30H BULLARD Man-Au-Trol Horizontal Lathe triples production on between-center shaft turning work by machining 3 finished pieces per cycle with its 3 identically tooled spindles. Simplified tooling for rough and finished cuts also reduces tooling costs. Multiple-tool blocks are provided when needed for grooving, recessing, chamfering, angle-turning and other such operations.

Finished Pieces REQUIRED *For 1*

MACHINES DO MORE

Reports are now coming in from owners of BULLARD Man-Au-Trol Horizontal Lathes proving that this machine's unique "3 for 1" method really pays off in lower production costs. See the accompanying chart for some actual figures.

Reasons for the high productivity of the BULLARD Model 30H Lathe come under three general headings: the "3 for 1" principle, operator convenience, and Man-Au-Trol versatility.

"THREE PIECES FOR ONE"

By turning out three finished pieces per cycle with its three identically tooled spindles, the BULLARD Model 30H perceptibly reduces the time per piece.

EASIER TO OPERATE!

This is a right-handed machine with headstock and all operating controls conveniently located at the operator's right. Convenient control of the hydraulically operated chucks facilitates loading and unloading. That's all the work he does when Man-Au-Trol is in 100% automatic operation. The rest of his job is merely supervisory.

AMAZINGLY VERSATILE!

This is an automatic *all-purpose* machine, thanks to Man-Au-Trol, *the automatic control that is as versatile as manual control*. It's quick and easy to change from one job to any other because it is not cam-operated. Instantly convertible from automatic to manual control at the turn of a single lever, it is practical for long or short runs.

WANT ALL THE FACTS?

When you study the specifications of the Model 30H BULLARD Man-Au-Trol Horizontal Lathe, you'll agree that no other horizontal lathe offers you such a combination of productivity, convenience, versatility and performance. Write today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.

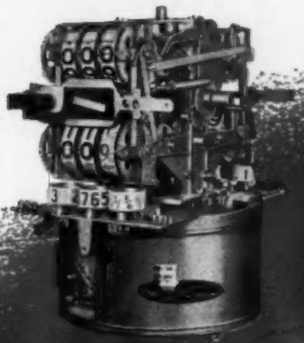
Because they are the hardest dressing sticks made, NORBIDE* sticks dress tool wheels quickly, efficiently—and have extremely long service life. Small (3/16 x ½ x 3″), lightweight and easy to use, NORBIDE dressing sticks are perfect for tool wheels 10″ and smaller, especially cup and saucer shapes. They are low heat conductors and therefore will not burn the hand.

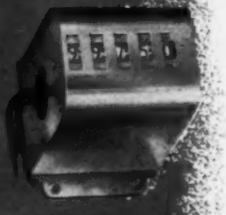
NORBIDE dressing sticks were first introduced to the trade two years ago. Such long service have they given that the original sticks are still being used in many plants. NORBIDE dressing sticks are molded, without bond, from Norton Boron Carbide—"the hardest material made by man." *For further information write to:*

NORTON COMPANY — WORCESTER 6, MASS.

*Reg. Trade-Mark

You Can COUNT on Veeder-Root





. . . at any point . . . in any business or industry

Typewriters, tractors, and textile looms . . . steel rolling mills, coin machines, and gasoline computer pumps . . . these and hundreds of other machines feature *built-in* Veeder-Root Counters which give their users up-to-the-minute *Facts in Figures* on operation, service, or production.

And these same *Facts in Figures* . . . delivered in terms of turns, strokes, pieces, trips, hours, volumes, lengths, light-flashes, hand-movements, or what have *you?* . . . are the bedrock basis of money saving, vigilant Veeder-Root *Count*rol.

See that all new machines and equipment you buy are equipped to give you Veeder-Root *Count*rol. And see how *your own products* can build up sales by building-in a Veeder-Root Counting Device. Write.

Gasoline Pump Co... ("Head for Figures") com-putes exact price of gaso-line pumped into your tank.

New 1260 General Purpose Counter, compact, straight-lined, easy to build into any product.

New 1248 Reset Magnetic Counter for remote indica-tion of machine production, from plant to office.

New 1268 Non-Reset Mag-netic Counter for coin ma-chines.

Revolution-Hour Meter for tractors shows elapsed length of service and when overhaul time is coming on.

2-3 Pick Counter, for tex-tile looms counts picks (shuttle-flights). Counter is con-vertible from 2 to 3 shifts.

Direct-Reading Counter in-dicates thickness of steel sheets passing through roll-ing mill.

Cut Meter for textile looms permits production of uni-form lengths of cloth with-out "cut marks." Cut Meter knocks off loom when pre-determined length has been woven.

Veeder-Root COUNTERS

VEEDER-ROOT INC. **Hartford 2, Conn.**

In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3
In Great Britain: Veeder-Root Ltd., Kilspindie Rd., Dundee, Scotland

CLARK BUILDS BOTH... and

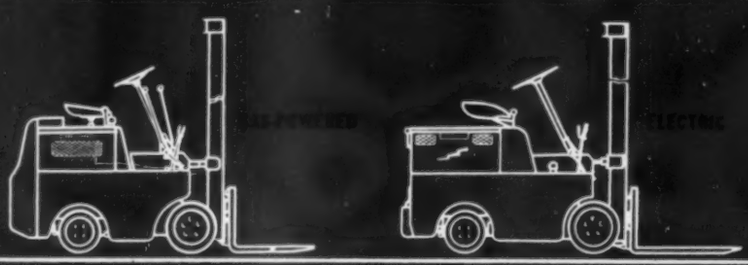
GAS-POWERED AND BATTERY-POWERED FORK TRUCKS

TRUCLOADER...

1000-lb. Capacity

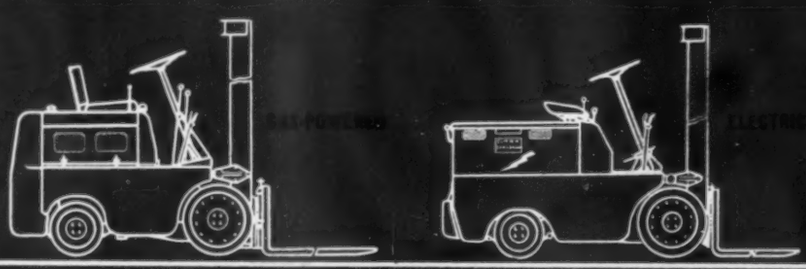
CLIPPER...

1500-2000 lb. Capacity



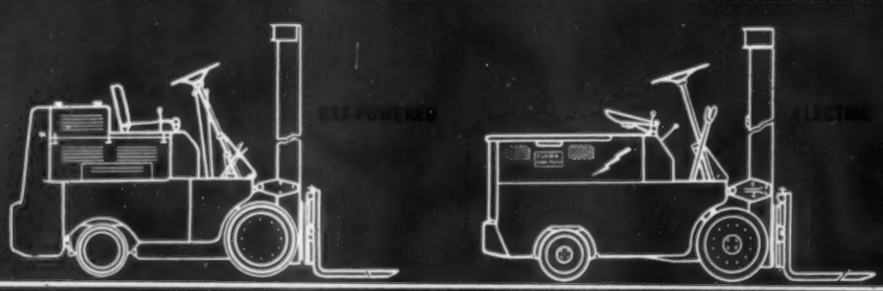
CARLOADER...

3000-4000-5000 lb. Capacity

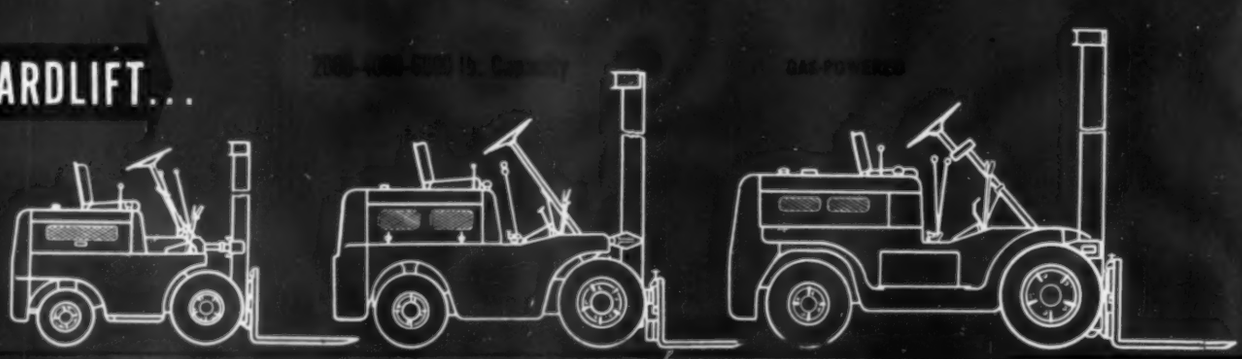


UTILITRUC...

6000-7000 lb. Capacity



YARDLIFT...



INDUSTRIAL TRUCK DIVISION, Battle Creek 3, Michigan

REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

BOTH BUILD PROFITS!

MATERIAL HANDLING *News*

this CLARK team sure has EVERYTHING ...A most complete line with capacities from 1000 to 7000 lbs.... PLUS unbiased evaluation of individual needs.

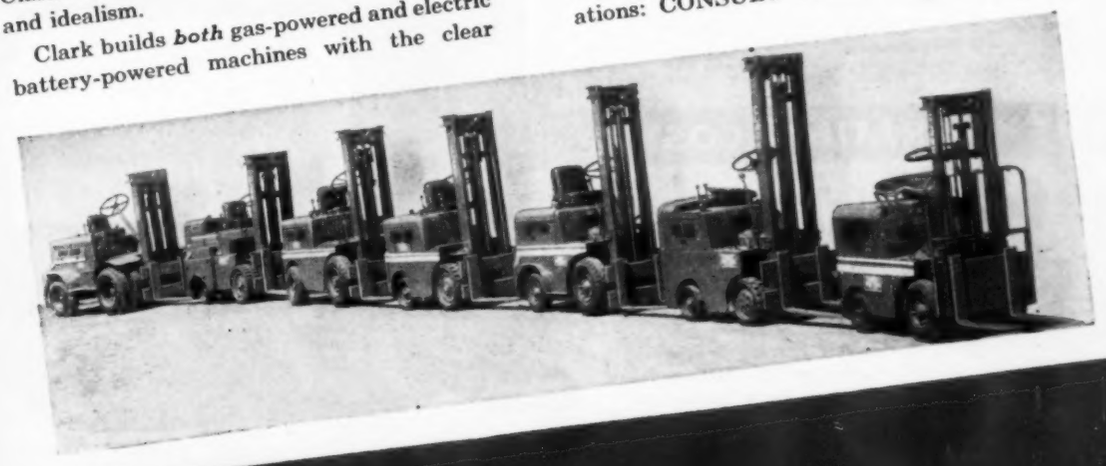
The truly vital element in any fabricated product is the idea back of it.

When Clark undertook some 30 years ago to build Materials Handling equipment, it was with the idea that it could evolve new and better handling methods and that it could produce for their implementation machines that would excel all others. That these objectives have long since been achieved and that they are maintained is demonstrated by Clark's leadership in the Materials Handling field. Furthermore, ***users*** endorse these products with enthusiasm and are quick to point out that they embody all the qualities that Industry has come to expect from Clark's unique experience, competence, skill and idealism.

Clark builds ***both*** gas-powered and electric battery-powered machines with the clear intent that each shall be the best of its kind. Insofar as possible, parts of the two power types are interchangeable for the sake of production economies which are passed along to the user in the form of lower initial cost and negligible maintenance costs. And practically all parts are manufactured in Clark's ***own*** plants to Clark's ***own*** exacting standards of quality and master workmanship.

To an analysis of Materials Handling operations, Clark brings complete objectivity because it is the producer of both power types. Its sole aim is to determine which type will serve more efficiently and more economically under conditions involved.

For a complete line that has EVERYTHING, and for dispassionate and unbiased counsel concerning Materials Handling operations: CONSULT CLARK.



CLARK EQUIPMENT COMPANY

BATTLE CREEK 3, MICHIGAN

OTHER PLANTS: BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN, U.S.A.

CLEVELAND

PRESSES
FOR LONGER DIE LIFE

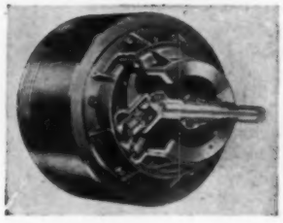
Modern "Cleveland" Presses have the gearing located in the box-type crown with the drive unit, eliminating overhanging brackets. This allows a more rugged type construction and reduces overall dimensions, saving valuable floor space. "Cleveland" Four-Point Presses have one connection at each corner of the slide. This arrangement plus extra-long bearing surfaces prevents the slide from tilting whether work is centered or not. Perfect alignment between the face of the slide and the bed is always maintained. There is little possibility of the dies overlapping. Not only is the life of the dies extended but constant accuracy is assured.

If you require unusual capacities, a Modern "Cleveland" Press can be made to your specifications. For more information on "Cleveland" Presses, address inquiries to Department 4 A.M.

MODEL 45-315-84-60

Stroke	18"
Adjustment	18"
Shut Height	54"
Strokes, per minute	15
Bed Area, F to B X R to L	60"x84"
Capacity	315 tons

CUT OPERATING COST



Use the
CLEVELAND (PAT.) DRUM TYPE FRICTION CLUTCH & BRAKE

Self Adjusting . . . ¼ the usual weight . . . ½ the usual parts . . . . Readily Serviceable . . . . Quicker Starting & Stopping . . . Always Full Clutch or Full Brake . . . More Dependable

THE
CLEVELAND
PUNCH & SHEAR WORKS CO.
U. S. A.

Established 1880

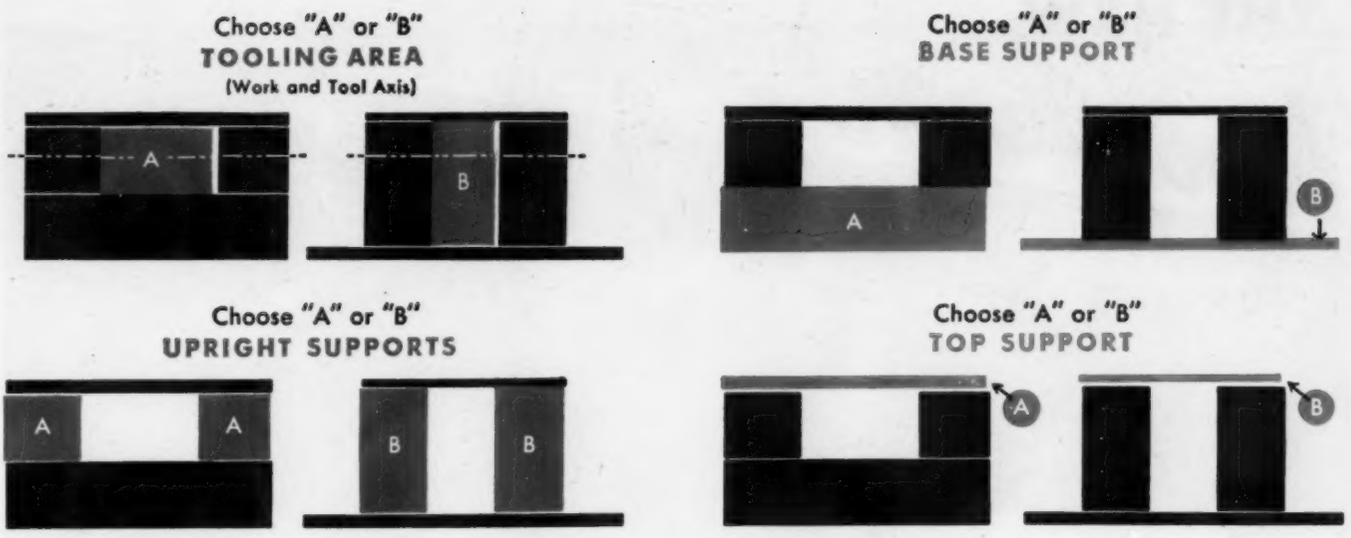
PUNCHING TOOLS & DIES

OFFICES AT
NEW YORK . . . CHICAGO
DETROIT . . . PHILADELPHIA
PITTSBURGH

FABRICATING TOOLS

CLEVELAND 14, OHIO

• • • • • • POWER PRESSES • • • • • •



HOW GOOD ARE YOU ON MACHINE DESIGN?

The all-round efficient service given by any machine tool, and the opportunity for its improvement and development, usually depend on advantages afforded by its basic design. Before purchasing a machine it will pay to look for the advantages or disadvantages of its basic design.

	MACHINE #1*	MACHINE #2	MACHINE #3	MACHINE #4	MACHINE #5
WORK & TOOL CAPACITY	✓				
WORK & TOOL SUPPORT	✓				
WORK & TOOL MAINTENANCE	✓				

*CONOMATIC

Any good investment has certain qualifications that prove it profitable. The wise investor and smart banker have some sort of measuring stick to analyze every investment they make.

Why not use a measuring stick to chart your purchases of Automatic Bar Machines? If you are already using a chart, perhaps you would like to compare it with the one that we have prepared. Write to us for a copy or ask the Cone representative.

Above are illustrated two types of frame design of Multiple Spindle Automatic Bar Machines. Assuming that the Tooling Area is important — and is as efficient as the frame around it permits — which of the two designs would you choose to meet the following requirements?

WORK & TOOL CAPACITY

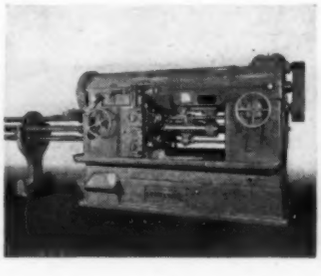
Long, open, roomy Tooling Area and long main end slide for handling longer work and for clearing die heads in threading, etc., to the full collet capacity of the machine; for heavy cross-slide cuts, deep hole drilling, and general all-round work with HSS or Carbide Tools.

WORK & TOOL SUPPORT

Genuine, horizontal, rectangular box-frame, free of overhang; heavy-set, rigid upright members for supporting head-stock and gear box units between heavy, full-length top and base members, for substantial support of all work and tools close to the work and tool axis, and for the maintenance of accurate alignment of work and tools.

WORK & TOOL MAINTENANCE

Heavy, strong, well supported, overhang-free, vibration-free, liberal bearing, convenient, adjustable, work holding units and tool slides, with accessible chip-free cams, with adequate capacity in base member for chip disposal and cutting coolant.



A comparison with ALL Automatics will lead you to

#1A

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

THE NEW Van Keuren

0 to 3" LIGHT WAVE MICROMETER

will improve your product . . .

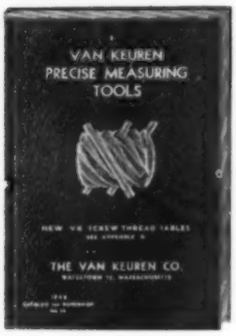
Hardened, Ground, and Lapped ½" diameter Micrometer Screw. Reads to .00001" Carboloy tipped spindle and anvil.

The
LIGHT WAVE MICROMETER HEAD

A source of dependable Precision for modern machine tool and instrument applications.

•

Price, with calibration chart **$75.00**



Catalog and Handbook No. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies now free upon request.

THE Van Keuren Light Wave Micrometer is an instrument of exceptional merit, proven over a period of 15 years. It has enabled hundreds of High School boys and girls to produce and inspect parts to "Hundred Thousandths" of an inch.

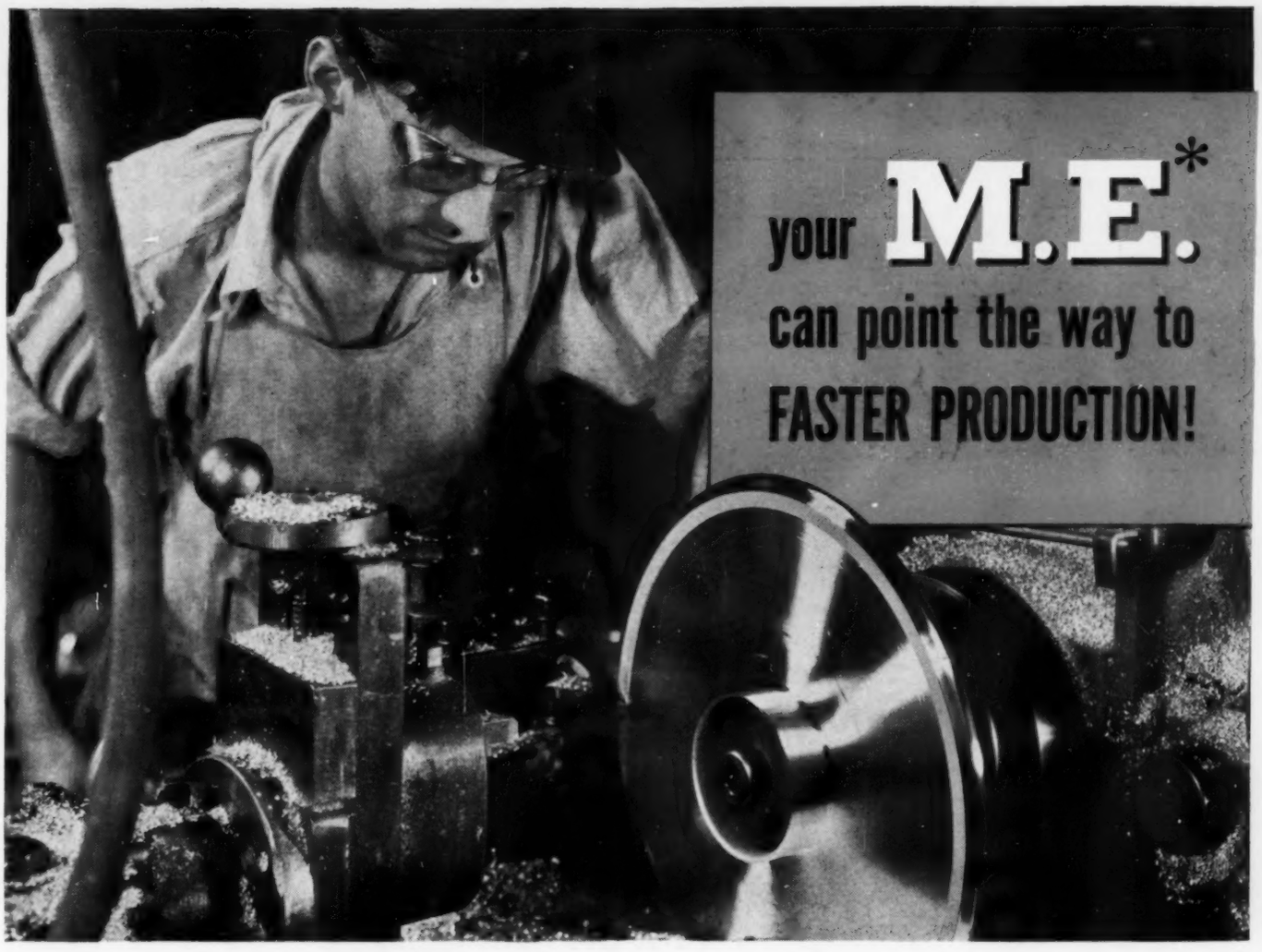
The New 0 to 3" Light Wave Micrometer has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non parallax, vernier index which enables readings to be made to .00001". It has an index lock. It has carboloy tipped anvil and spindle. It is a sturdy, yet sensitive instrument which weighs 17 pounds. It is a portable measuring machine, built for "Sustained Accuracy."

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision—fast, accurate and profitable.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



Give your M.E. a chance to help cut finishing costs for you!

The magnesium castings he designs will machine fast and easily to a superlative finish, in a fraction of the time other production metals require. Your first cut can be your finish cut.

Magnesium-light products have new sales appeal. And easier handling, when they weigh only a fourth as much as iron. No waiting for trucking or hoisting. Just hand them along.

You can get American Magnesium Castings, Forgings, and Extruded Shapes on dependable delivery schedules in the quantities you need for full production. If you haven't an M.E. in your shop, we'll be glad to send one of ours.

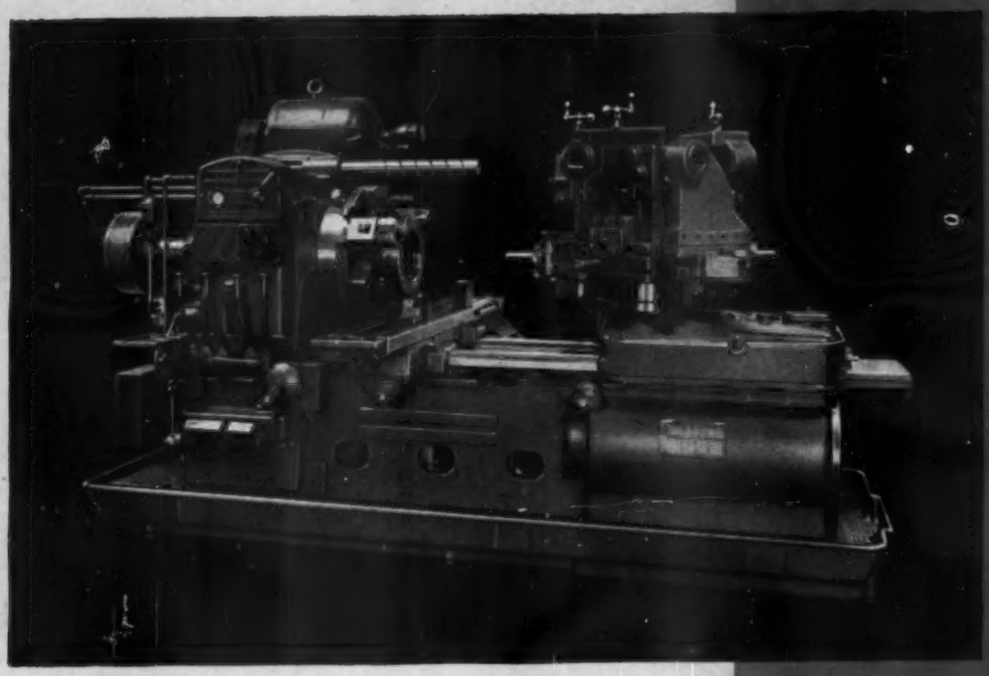
ALUMINUM COMPANY OF AMERICA, sales agent for American Magnesium Products, 1709 Gulf Building, Pittsburgh 19, Pennsylvania.

*M.E., in this case, means Magnesium Enthusiast, and Mechanical Engineer as well. He's probably young, may have joined you since the war. He knows from experience the powerful appeal of American Magnesium parts: castings 75% lighter than iron, 35% lighter than aluminum. He knows the economics of magnesium which make his recommendations practical.

MAGNESIUM MAZLO PRODUCTS
Reg. U. S. Pat. Off.

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA



6DRE

Advanced features ... of the P&J 6DRE AUTOMATIC TURRET LATHE *contribute to lower cost production ... of large duplicate parts*

The 6DRE series of automatic turret lathes are designed with the power, rigidity and control convenience to enable them to handle the production of large parts economically. Versatility in tooling, characteristic of all P&J machines, makes them adaptable to a wide range of work.

These machines are provided with 4 automatic changes of spindle speed, 3 selective automatic changes of feed and automatic binding of turret after indexing. Other features are direct slide action, and a motor driven constant rapid traverse motion to cross slide and turret slide.

P&J Methods Engineers are available to assist you in taking advantage of the production possibilities of this and other machines in the P&J line to cut your costs of machining duplicate parts.

For more complete information send for catalogue 139.

CONDENSED SPECIFICATIONS

	6DRE	6DREL	6DRELX
Swing over bed	34"	34"	34"
Cross Slide Travel (each way)	8½"	8½"	6¼"
Turret Faces	5	5	6
Turret Slide Travel	18"	25"	28"

OTHER P&J AUTOMATIC TURRET LATHES

Model 3U—(Swing over cross slide: 9½")
Model 4D—(Swing over bed: 21")
Model 5D—(Swing over bed: 25")
Model 5D-2—(2-spindle Swing Limited by Spindle to Spindle Center Line Distance 10½"-15½")
Model 6DS—(Swing over bed: 34" and 40")
Model 8DT—(Swing over bed: 36")

POTTER & JOHNSTON COMPANY
PAWTUCKET, RHODE ISLAND
Subsidiary of
Pratt & Whitney
division Niles-Bement-Pond Company

Threaded Holes FOR SALE!

Tap users rightly think in terms of the "cost per threaded hole".

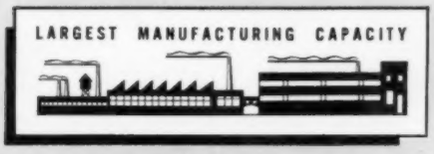
Thus they get a true measure of tap value which is more than the cost of the tap itself. It includes getting the right tap for the job in the quickest possible time. It includes accuracy and long life of the tap while on the job.

Here are some of the PLUS values that are behind all taps with the GTD trademark:

SERVICE from the country's leading distributors who handle "Greenfield" tools.

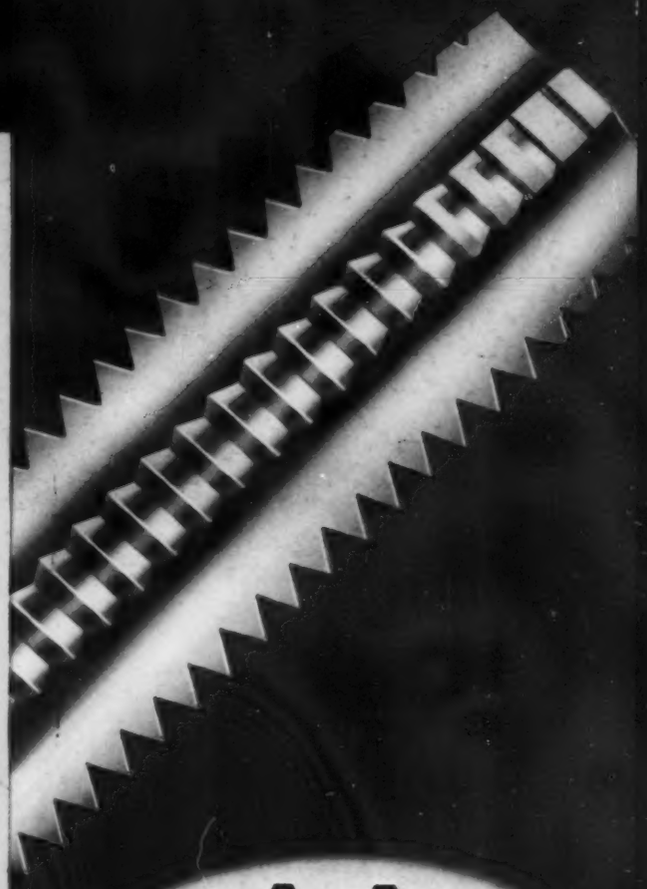
ON-THE-SPOT HELP on threading problems from the "Greenfield Man" in your territory.

BUILT-IN VALUES that come from the industry's largest research staff of threading engineers.



PERFORMANCE that comes from a product made in the largest, most modern threading tool plant in the world.

That's why . . . when you buy . . . you get more for your money when you say "Greenfield"



GTD GREENFIELD

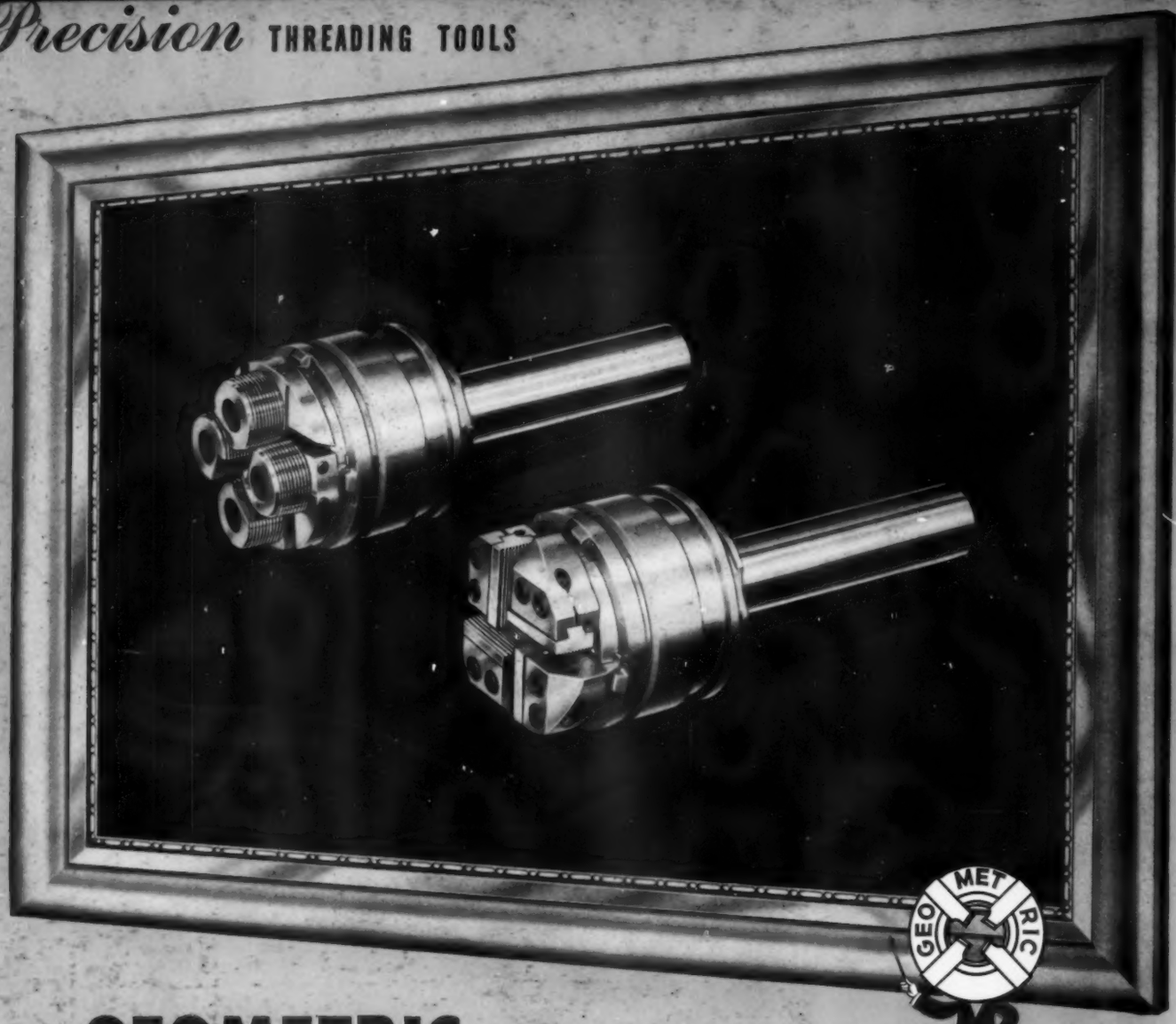
World's Leading

THREADING TOOLS

When you buy GTD "Greenfield", you get a quality of product that comes from the world's largest, most modern threading tool plant and its research staff of threading engineers—PLUS SERVICE from the leading distributors and GTD "Greenfield's" field men in every industrial center.

GREENFIELD TAP and DIE CORPORATION GREENFIELD, MASSACHUSETTS

Precision THREADING TOOLS



GEOMETRIC STYLE TR ROTARY

Combination Tangent and Circular Chaser DIE HEADS

Unique Design Saves Time and Money

For those threading jobs that call for the use of either tangent or circular type chasers, this GEOMETRIC COMBINATION DIE HEAD offers several definite advantages. *First,* it will accommodate Chaser Holders for both the tangent or circular type of chaser. *Second,* it has improvements in design which greatly lessen expensive down time for grinding and re-setting. It also permits threading with the greater part of the threaded surface of the chaser. Chasers and Chaser Holders can be removed without taking the head from the machine, which further reduces down time.

Finally, because of their small diameters and short over-all lengths these GEOMETRIC COMBINATION DIE HEADS will fit into the most limited spaces on any machine. Rotary Type Style TR and Stationary Type Style TH Combination Die Heads are made in three sizes with a cutting range of diameters from ⅛ to 1½ inches and are equipped with "Tangemetric" or "Circometric" Chasers and Holders, as specified. *For complete details about the GEOMETRIC COMBINATION DIE HEADS, send today for the free bulletin on this line.*

USE COUPON FOR FREE INFORMATIVE BULLETIN NO. T-3

THE GEOMETRIC TOOL COMPANY
7 Valley Street
New Haven 15, Connecticut

Please rush me a copy of Bulletin No. T-3 which describes in detail the many advantages of the Geometric Combination Die Heads.

*Name*_____

*Firm*_____

*Street*_____

☐ *Bus.* ☐ *Res.*

*City*_____ *Zone*____ *State*_____

GEOMETRIC

TO[illegible]

SAVE 3 WAYS with a KRW 100-TON HYDRAULIC PRESS

SAVE MONEY LOWER INITIAL AND OPERATING COSTS

SAVE WEAR AND TEAR ON WORKER'S NERVES

SAVE SPACE COMPACT...NEEDS NO EXPENSIVE FOUNDATION

Gardner Manufacturing Co. of Horicon, Wisc., uses a 100-Ton KRW Hydraulic Blanking and Forming Press equipped with Wales-Strippit die to do multiple punching of battery charger panels and other similar work.

KRW Hydraulic Presses offer multiple savings to every user and do better work in the bargain. Gardner Manufacturing Co. of Horicon, Wisc., says for example..."Our problem of punching sheets with multiple holes and keeping them accurate according to template has been solved with this press." Other manufacturers, after installing 100-Ton KRW Presses, say other things just as complimentary. Net of all these experiences is USERS SAVE MONEY, Reduce Costs, Make Greater Profits or, putting it another way, are able to outbid competition with better prices.

KRW Presses are highly flexible...they can be built with platen sizes up to 36" x 60", and can be gap, open or closed-end in type. Tonnage pressures can vary from 25 to 100 tons. Because they are hydraulically operated and not mechanically driven, they are quiet and vibrationless in operation. They are equipped with automatic safety and operational controls. Platens can be stopped at any point in their travel.

START SAVING NOW! MAIL COUPON TODAY!

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please quote me prices and information on following type KRW Presses. Gap ☐ Open End ☐ Closed End ☐

Tonnage Req..... Die Dimensions.....

Name.....

Address.....

City and Zone..... *State*.....

speed PRODUCTION! *with*

UNBRAKO

Reg. U. S. Pat. Off.

Knurled

SOCKET SCREW PRODUCTS

(A)
Pat'd. & Pats. Pending

Millions of these "Unbrako" Socket Screw Products—in sizes from No. 4 to 1½" diameter, in a full range of lengths—are being used throughout industry to: *save assembly time, facilitate compact designs, reduce weight and costs.*

(A) The Knurling—as shown—swages the threads of this patented "Unbrako" Socket Set Screw—so that it becomes a most excellent Self-Locker . . . for use with—cone, flat, oval, half and full dog points, which can not be knurled—a Set Screw that positively "will not shake loose"!

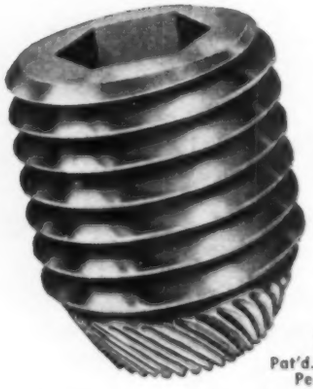
(B)

(B) The head of this ubiquitous "Unbrako" Socket Head Cap Screw is KNURLED to speed assembly. The KNURLS "gear" right to the fingers, no matter how oily, and a positive slip-proof grip is the result—no waste motion. Of course, the Internal Wrenching feature provides cost savings in material, weight and space.

(C) The patented KNURLED cup point of this popular "Unbrako" Socket Set Screw makes it a Self-Locker . . . because the sharpened edges of the counter-clock-wise KNURLS positively prevent creep, regardless of the most chattering vibration. A real fastener, if ever there was one . . . positively *will not shake loose!*

As all our patented "Unbrako" Set Screws, regardless of point, are Self-Locking, we can lock most any set screw application. We are prepared to furnish "Unbrako" Socket Screw Products in Stainless Steel.

Write us for the name and address of your nearest "Unbrako" Industrial Distributor and your copy of the "Unbrako" Catalog.



(C)
Pat'd. & Pats. Pending

Knurling of Socket Screws originated with "Unbrako" in 1934.

Kits. Pats. Pend.

You can't tighten or loosen socket screws without a hex socket wrench, so why not get our No. 25 or No. 50 "Hallowell" Hollow Handle Key Kit which contains most all hex-socket bits.

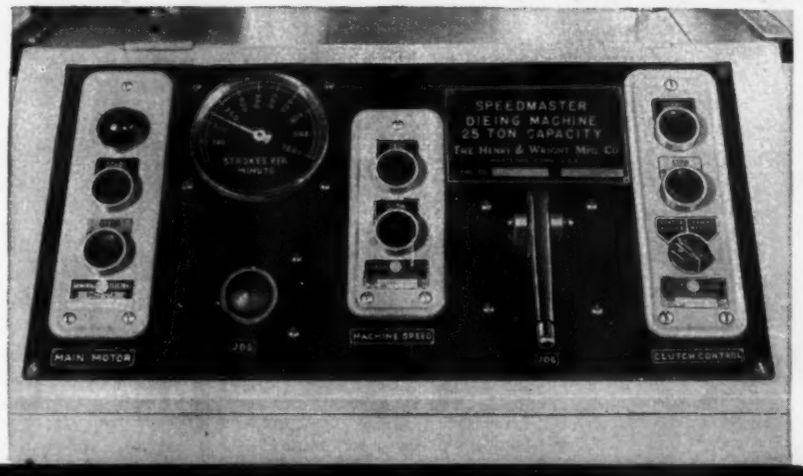
OVER 45 YEARS IN BUSINESS

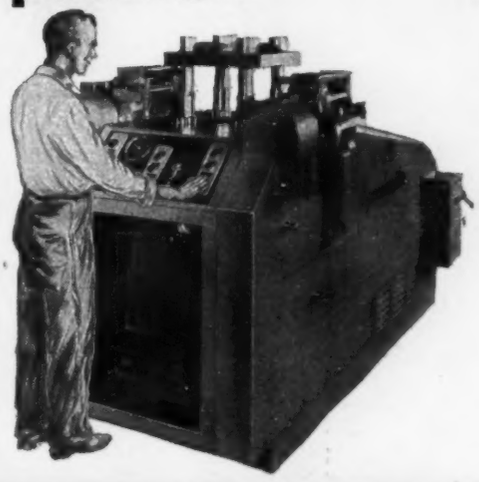
STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNSYLVANIA, BOX 4

BRANCHES: CHICAGO DETROIT SAN FRANCISCO ST. LOUIS

The whole operation of the *SPEEDMASTER* is controlled from this one position





Centralized control panel with fingertip variable speed permits maximum operating effectiveness for all work

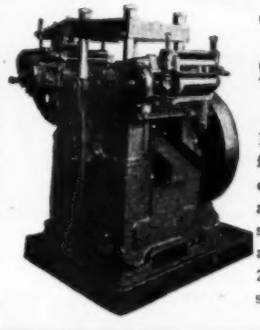
One operator can control the whole production job at this one Speedmaster control panel. He can watch the functioning of the dies, turn the motor on or off, increase or decrease the speed, operate the jogging or inching control for setup purposes, operate the clutch control for single non-repeat stroke or continuous operation and watch the blanks as delivered from the machine. In this way, the operator has complete range and utmost flexibility of control, always keeping the machine adjusted for optimum production and long die life.

SPEEDMASTER FEATURES

- Patented Counterbalance System added to lower crosshead so completely eliminates vibration that machine WILL OPERATE OVER ITS ENTIRE SPEED RANGE WITHOUT BEING BOLTED TO THE FLOOR.
- Centralized Variable Speed Control giving the operator fingertip control to adjust to the optimum which the work will permit.
- Aluminum Alloys reducing inertia of reciprocating parts.
- Centralized Controls, operating 100% from one position.
- Automatic Lubrication to all required points . . . Friction Clutch Pneumatically actuated, electrically controlled.
- Scrap Cutter actuated by crankshaft . . . Water-cooling of oversize roll feed brakes . . . Brake Synchronizer assures top-of-stroke stopping within entire speed range.
- All working parts safely enclosed yet 100% accessible.
- Permits use of simple Stacking Chutes to hold blanks in same relative position as delivered from die.
- SPECIAL DIES NOT REQUIRED. The great majority of dies being used in conventional presses, can be used in the Speedmaster with little or no modification. Dies used in the 25-ton Standard Dieing Machine are suitable for the Speedmaster with no change.
- Re Carbide Dies—the Speedmaster gives the speed range suitable for carbide dies, and at the same time the "Precision-guiding" essential to assure safe operation and maximum life.

The *SPEEDMASTER* gives you *Both* MAXIMUM SPEED AND MAXIMUM DIE LIFE!

STEP UP TO THE *SPEEDMASTER* AND YOU STEP UP PRODUCTION



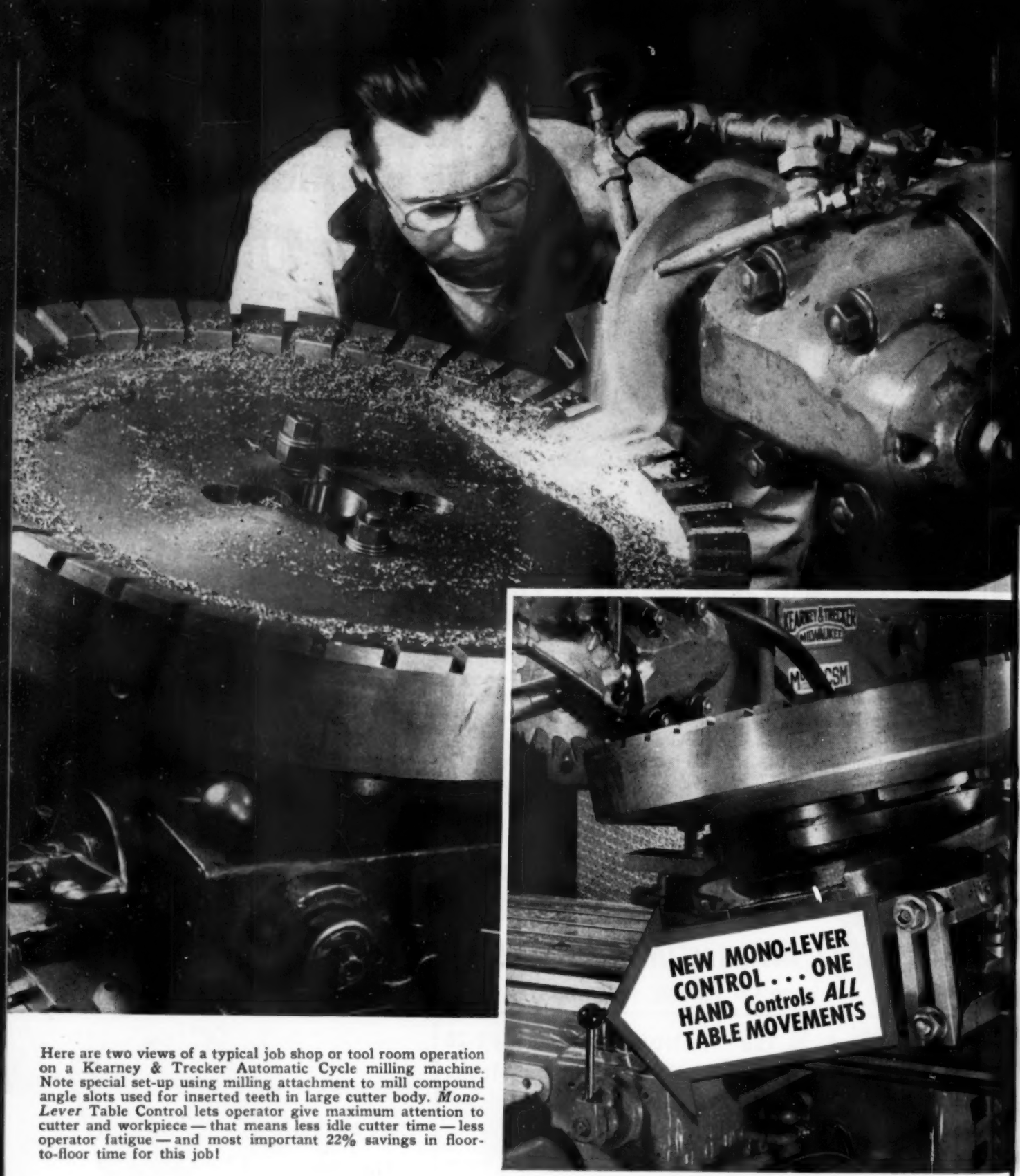
The "STANDARD" Produces 1-20 Stampings Complete-per-Stroke

A unique "upside-down" principle of construction gives Dieing Machines a low center of gravity, with resultant freedom from vibration. Pulling the upper crosshead downward by four alloy steel rods "precision-guided" in adjustable taper bushings, further contributes to amazing smoothness at high speeds, and precision of action. Standard Dieing Machines using progressive dies produce 1 to 20 stampings complete per stroke at speeds up to 600 s.p.m. Capacities: 10 tons to 300 tons.

REQUEST CATALOG No. 48

HENRY & WRIGHT MFG. CO. 485 WINDSOR ST., HARTFORD, CONN.

HENRY & WRIGHT DIEING MACHINES

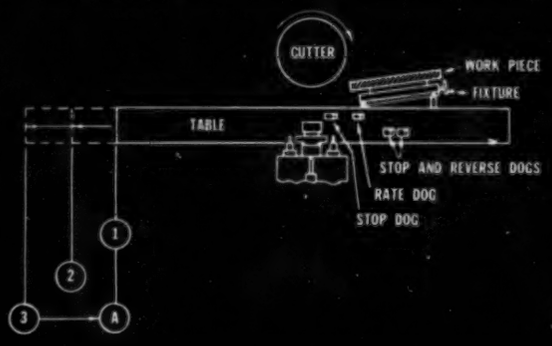


Here are two views of a typical job shop or tool room operation on a Kearney & Trecker Automatic Cycle milling machine. Note special set-up using milling attachment to mill compound angle slots used for inserted teeth in large cutter body. *Mono-Lever* Table Control lets operator give maximum attention to cutter and workpiece — that means less idle cutter time — less operator fatigue — and most important 22% savings in floor-to-floor time for this job!

In face of rising costs . . CAN YOU CYCLE TIME SAVINGS

HOW JOB IS DONE

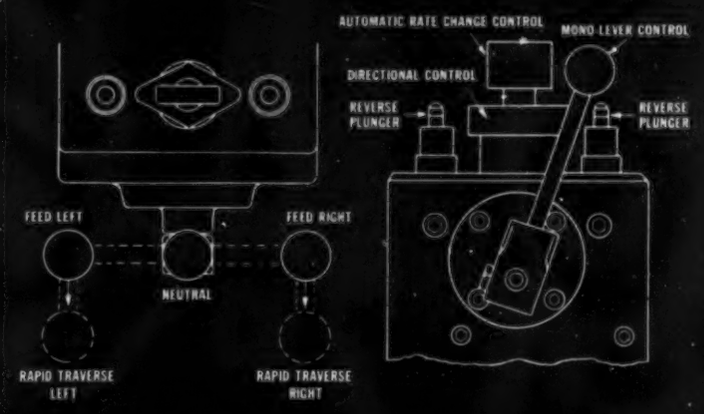
USING AUTOMATIC TABLE CYCLE AND MONO-LEVER CONTROL



1. Operator engages Mono-Lever. Table advances in rapid traverse to point of cut (2).
2. Feed dog changes rapid traverse to feed for cut. Table feeds through cut to (3).
3. Stop and reverse dogs reverse table in rapid traverse back to starting point (A) to stop. Operator indexes workpiece and repeats cycle.

HOW IT WORKS

AUTOMATIC TABLE CYCLE and MONO-LEVER CONTROL UNIT



YOU'RE LOOKING at a diagram of the job at the left. See how *Mono-Lever* Control and Automatic Table Cycling make it easy for the operator . . . speed up production. No wonder users report 16 to 31% savings in cycle time alone.

THINK OF IT! Now you can have all the advantages of this great cost-cutting feature plus the all-around versatility of general purpose, knee-type machines . . . faster, easier control for greater production with less operator fatigue.

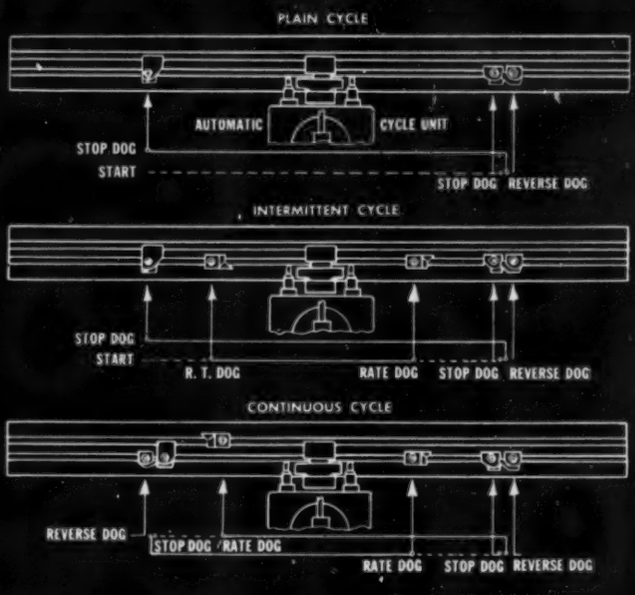
YES! Kearney & Trecker's constant research and development program—always directed at getting greater production at lower costs—has found what you have been looking for.

They're new knee type milling machines that combine mass unit production and versatility for general purpose and job shop work. Kearney & Trecker Milwaukee knee-type milling machines equipped with Automatic Table Cycle and *Mono-Lever* control *do just that.* They offer you *right now* the opportunity to mill *more units* with *more profit* in *less time.*

Of equal importance to you is the opportunity for proper machine selection. You neither *over-buy* nor *under-buy*, but you buy *right* when you choose from the *56* machines in this new Kearney & Trecker line.

For some startling facts about these machines and their application to your milling work, consult a Kearney & Trecker Sales Representative today. He's been schooled in the "know-how" and he's at your service. For detailed information, contact him or write us direct. Ask for catalog No. AC-10A. Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

TYPICAL CYCLES YOU CAN USE



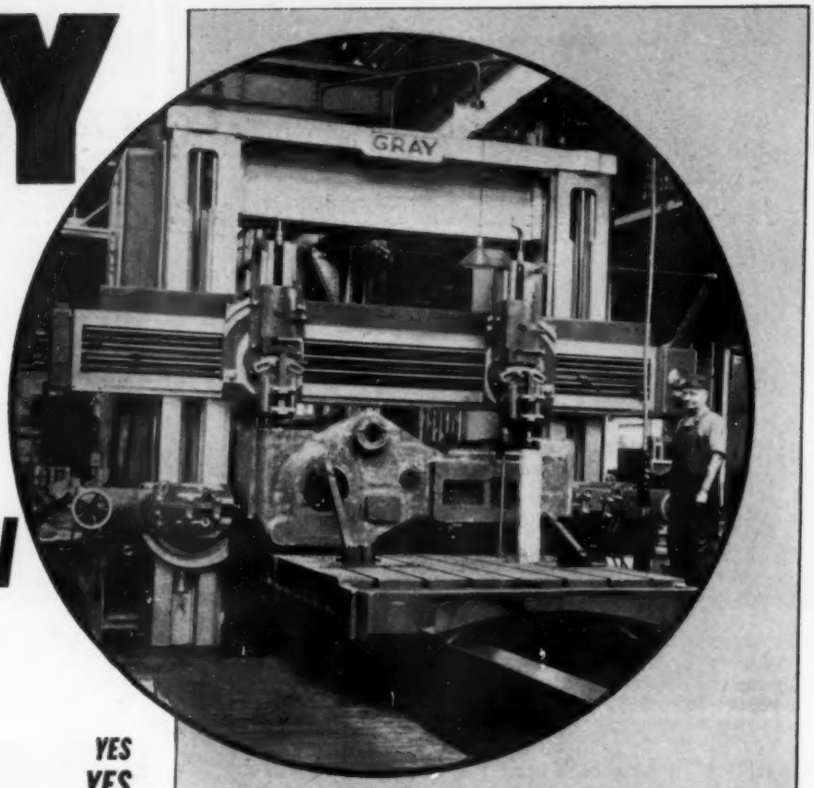
THREE DIFFERENT TYPICAL CYCLES to accommodate various length of runs. Using the completely automatic cycle feature effects savings of up to 31% for lots of 10 or more pieces. Cycle can be pre-set to meet operators required loading and unloading time and can be reversed in feed or rapid traverse.

AFFORD TO PASS UP UP TO 31% OR MORE?

GRAY

delivers

HI-SPEED PRODUCTION



Heavy Cuts? YES
Interrupted Surfaces? YES
Hard, Close Grained Iron? YES
54,000 lb. Table Load? YES
4 Head Operation? YES
Carbide Tools? YES

This 96" x 84" x 22' Gray Heavy Duty Double Housing Planer is planing Nut Machine Frames at The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

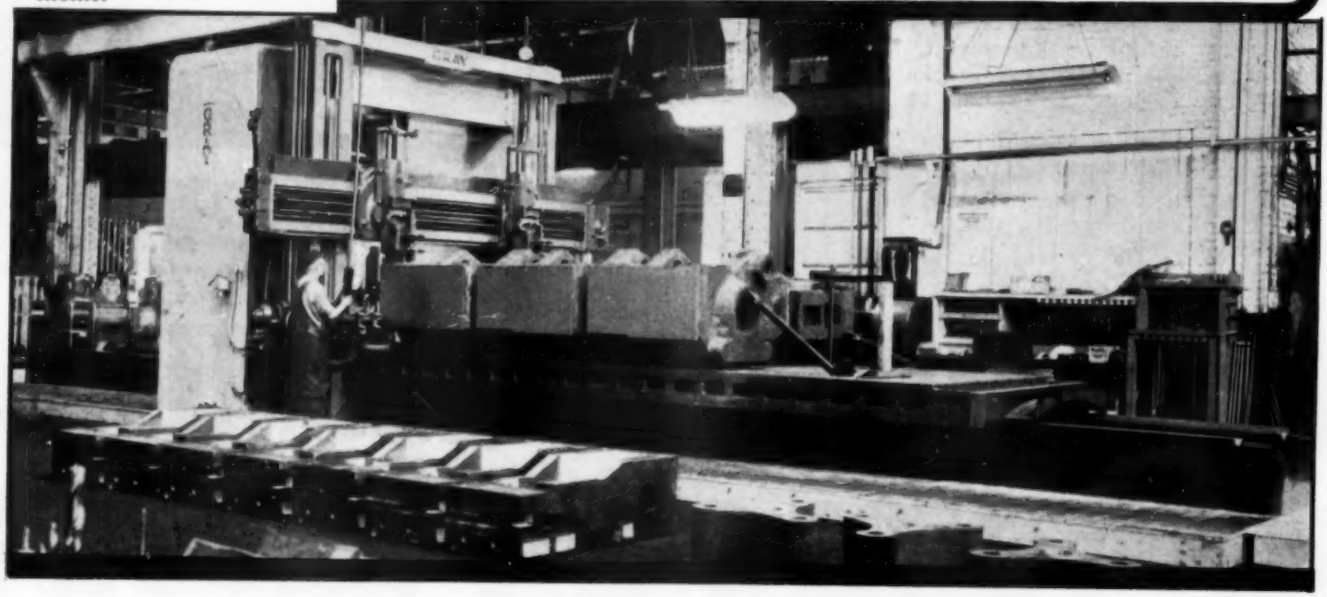
Here again, modern hi-speed Gray Planers produce BETTER WORK — FASTER.

Made possible by Gray Non-Metallic Table Ways, Loop Lubrication, Space Saver Drive and a host of other new developments.

The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machine
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.
SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES



SNOW FULL UNIVERSAL DRILLING MACHINE

The SNOW Full Universal Drilling Machine permits the drill to set its own rate of feed resulting in higher production and greater tool life.

Precision limit switches offer extremely accurate depth control and allow instant synchronization of the many types of air operated indexing and clamping fixtures and jigs which have been designed for use with this machine. Low pressure air control built into this full universal equipment, combined with quality design and construction results in a sensitive and sturdy production machine.

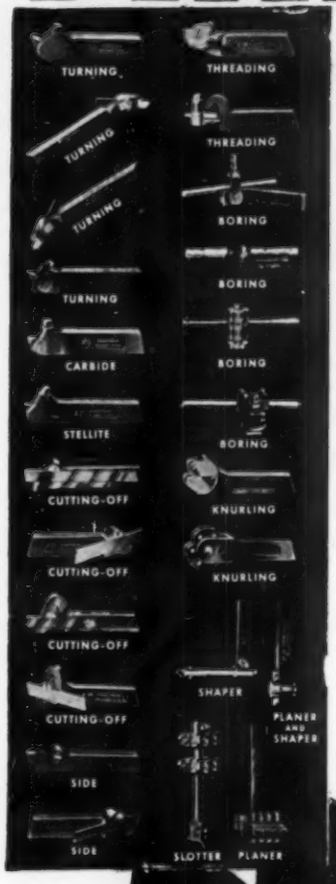
This machine is capable of operating as high as 6,000 strokes per hour and has been production-tested in thousands of installations.

We suggest that you submit sample parts and blue prints for specific recommendations, production estimates and tooling data.

SNOW MANUFACTURING COMPANY

437 EASTERN AVE., BELLWOOD, ILL. • SUBURB OF CHICAGO

ARMSTRONG



More Tools Per Man for More Profit

Even when labor was cheap and tools were costly, it was the best tooled shops that prospered. Now with wages higher and the work days shorter, it becomes imperative that every worker be supplied with every tool that will increase his hourly production.

See that each lathe, planer and shaper operator has the correct ARMSTRONG TOOL HOLDERS for each operation he performs. Equip each machine with its full complement of ARMSTRONG Setting-up tools. Use better balanced, handier ARMSTRONG WRENCHES on machines and assembly lines. Specify ARMSTRONG Drop Forged "C" Clamps and Lathe Dogs. . . . Today, only quality tools can be truly economical.

Write for the ARMSTRONG Catalog. It has page after page of production-increasing, cost-cutting tools.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 West Armstrong Avenue Chicago 30, U. S. A.

Pacific Coast Whse. and Sales Office: 1275 Mission St., San Francisco 3

Eastern Whse. & Sales 199 Lafayette St., N. Y. 12, N. Y.

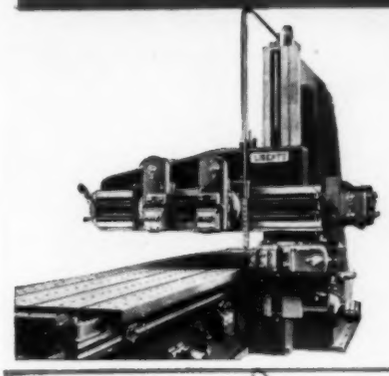
Write for Bulletins on—

(a) ARMSTRONG Carbide Tool Holders and ARMIDE Carbide Cutters

(b) ARMSTRONG CA Tool Holders and ARMALOY Cast Alloy Cutters

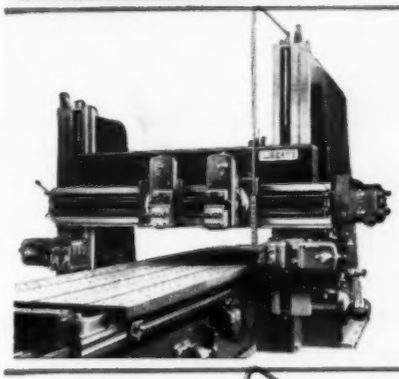
LIBERTY

BUILDS 3 *great* PLANERS



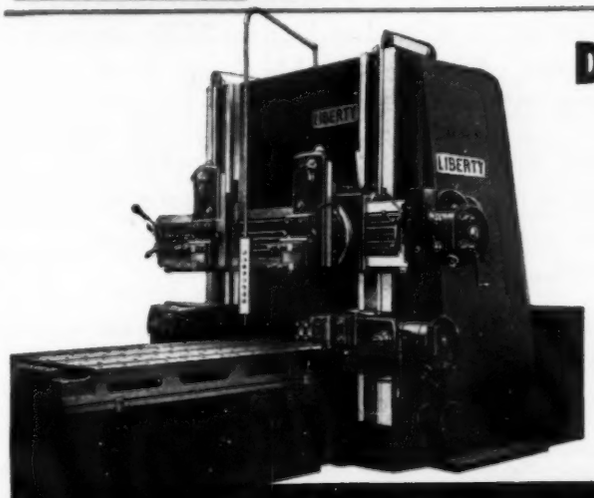
OPEN SIDE

For shops handling work of variable widths. Wide-faced housing and motorized clamp give rigidity for heavy roughing cuts and finishing. Dual control; electric feeds; rapid traverse to all Heads in all directions.



CONVERTIBLE

For exceptional rigidity on variable widths. Two, three or four heads. Offset heads permit closest approach of tools. Double balanced driving gear and pinions. Extreme accuracy.



DOUBLE HOUSING

For rapid production combined with accuracy. Two, three or four heads. Extremely rigid; handles production work with maximum cutting feeds and speeds. Table pulled into tool. Electric clamping and dual control for ease of operation; high production.

Write for catalog giving complete details.

All lengths, 24" x 24" wide and larger.

LIBERTY PLANERS, INC.

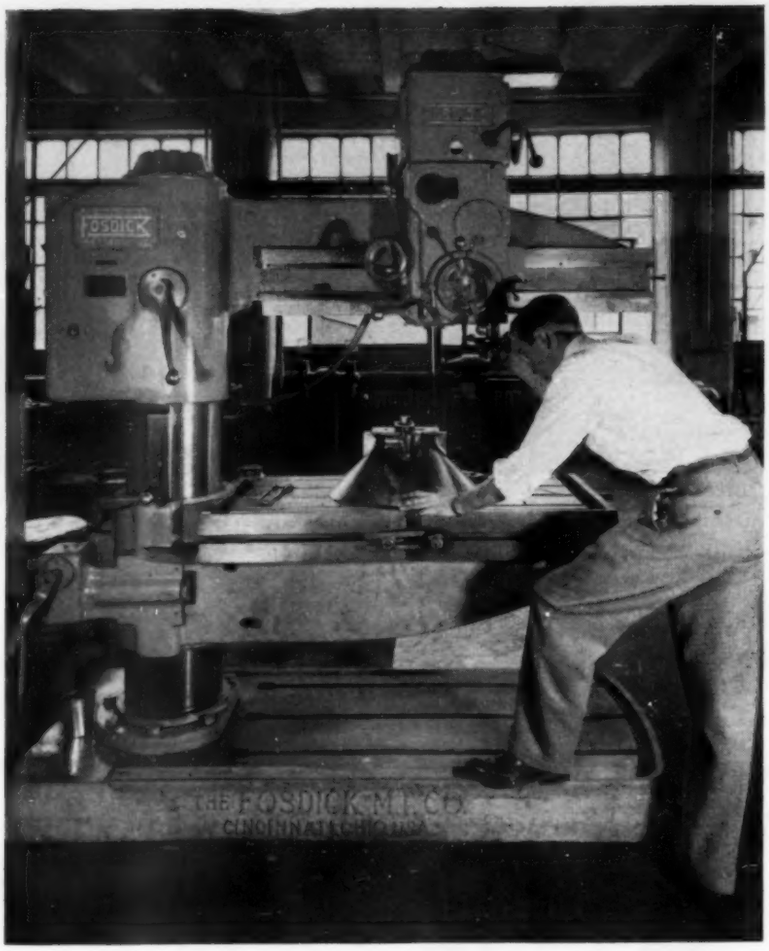
HAMILTON, OHIO

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 W. MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

For Jobs requiring Speed and Versatility-

FOSDICK *Sensitive* RADIALS



● For those widely varying jobs requiring holes up to 1½" dia. this new sensitive radial is ideal. It offers all the advantages of the high speed sensitive drill plus the versatility of the radial.

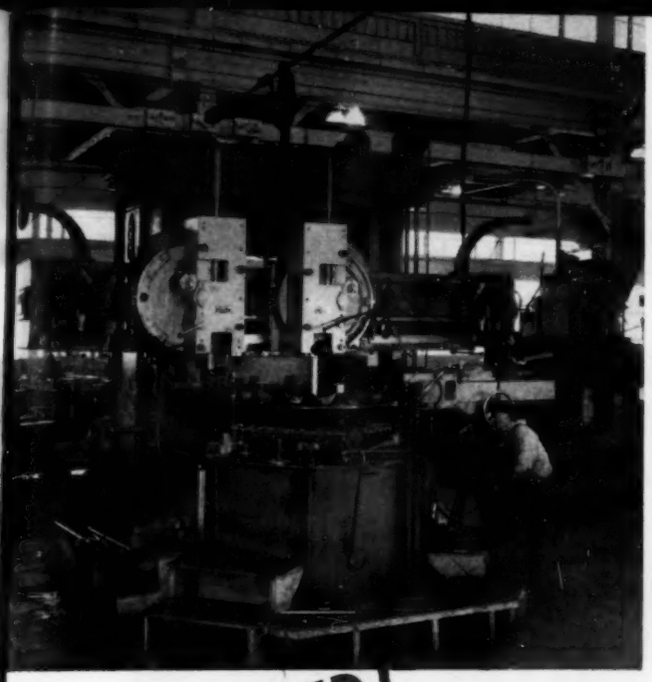
Note in the installation shown how the work is mounted on the adjustable table in the correct position for drilling. All controls are within easy reach of the operator and if more than one hole is to be drilled the operator merely shifts head and arm into proper position without moving the work. Both arm and table swing in an arc of 360° and the conventional base is available for tall work. The head is simple in design, there are nine speeds and four feeds. Spindle speeds as low as 60 R.P.M. and as high as 3500 are available. Feeds obtainable range from .002 to .020.

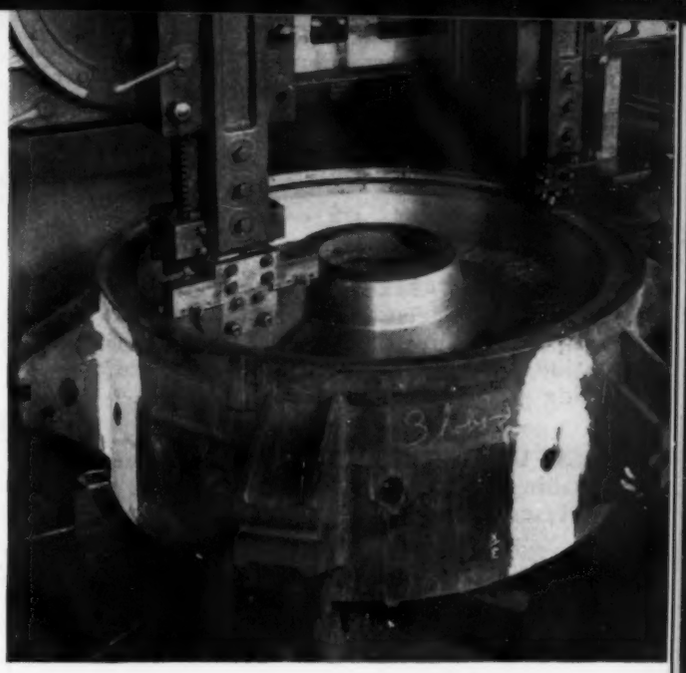
If you are in the market for a machine capable of drilling—reaming—and tapping holes up to 1½" dia., investigate the Fosdick Sensitive Radial.

Complete specifications and other pertinent data is available in the Fosdick Radial Bulletin S.R.A. *Write for your copy today.*

The photo shown is by courtesy of the Central Machine Works, Phila., Pa.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO





MORE SPEED!
MORE POWER!
MORE PRODUCTION!

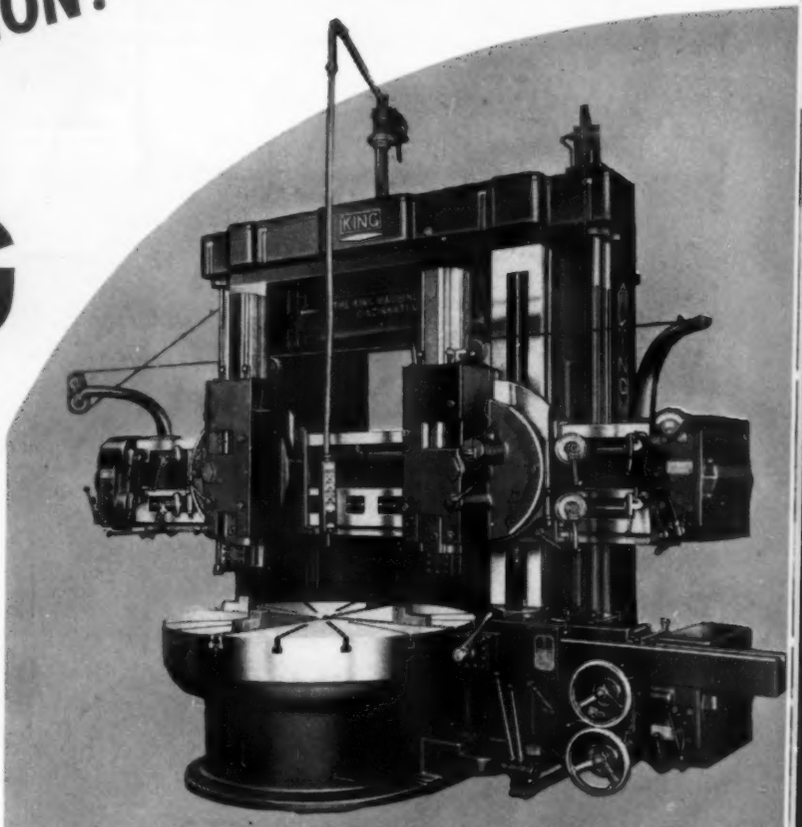
With the New Series KING

VERTICAL BORING & TURNING MACHINES

If your production involves boring, facing, turning, and similar operations, there's a New Series KING that will handle it easier, faster, at less cost.

Because they are substantially HEAVIER, these new KINGS have the rigidity, power, and range of feeds and speeds essential for successful use of carbide tools. New rectangular-type rams have eight bearing surfaces, are fitted with four taper gibs for accurate alignment. Centralized controls save time *on* the job and *between* jobs.

Call in a KING engineer—let him show you exactly *how* you can save time and improve quality on your boring, facing, and turning work.



New Series KING Machines are made in ten sizes: Single Column, one head on rail, 30", 36", and 42" swing; Double Column, one or two heads on rail, 52", 62", 72", 84", 100", 120", and 144" swing. All available with or without side head. Write for specifications on the size machines that meet your work requirements.

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

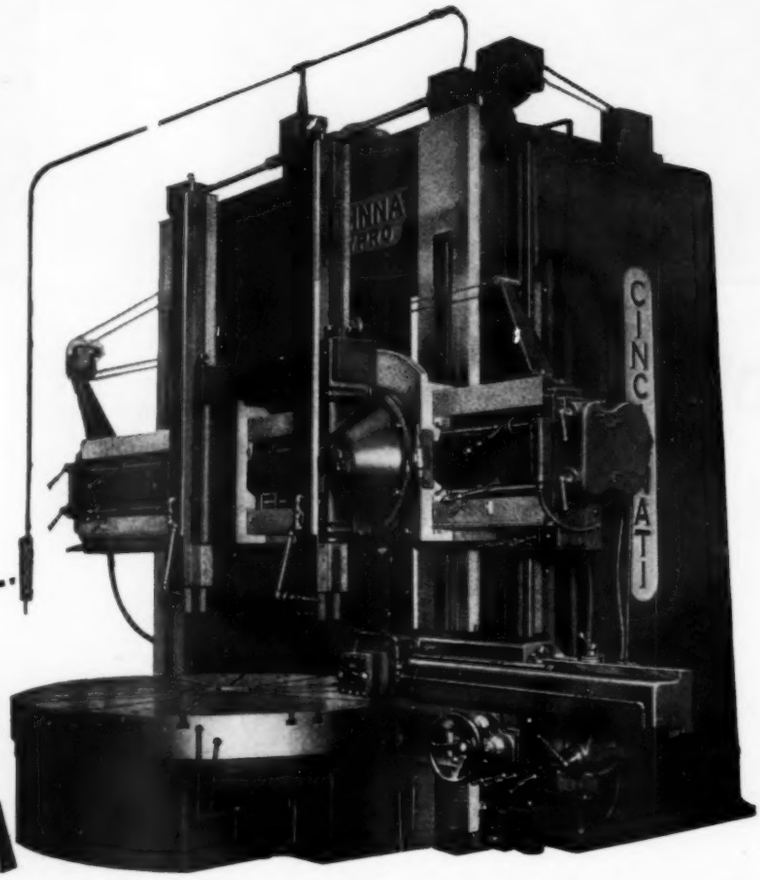
Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

FINE INCREMENT SPEED CONTROL—Multi-point, fine increment motor rheostat controlled from operators position, eliminates compromise speed settings, inevitable with conventional gear changes. Exact cutting speed assures maximum production.

TAILORED TABLE SPEEDS—On work of varying diameter table speed may be continuously adjusted for maximum production, without stopping table, without shifting gears and while tools are cutting.

SET UP TIME REDUCED—Fine increment table inching control in forward and reverse directions with dynamic braking.

OPERATOR'S FATIGUE ELIMINATED — Complete control of all motors from single accessible pendant station, plus absence of table clutch and brake shifting lessens operator's fatigue.



Effortless Control
COMES WITH
CINCINNATI
HYPRO
SPEED CONTROL

CAN NOW BE FURNISHED ON ALL HYPRO BORING MILLS IN FOLLOWING SIZES:

54"—64"—6'—7'.
7' widened to 8'. 8'—10'—12',
12'—16' Extension type.

THE CINCINNATI HYPRO PLANER COMPANY
PLANERS · BORING MILLS · PLANER TYPE MILLERS
CINCINNATI, OHIO

Subsidiary of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

More Efficient hobbing

ON
BARBER-COLMAN
No. 16-16
HOBBING MACHINES

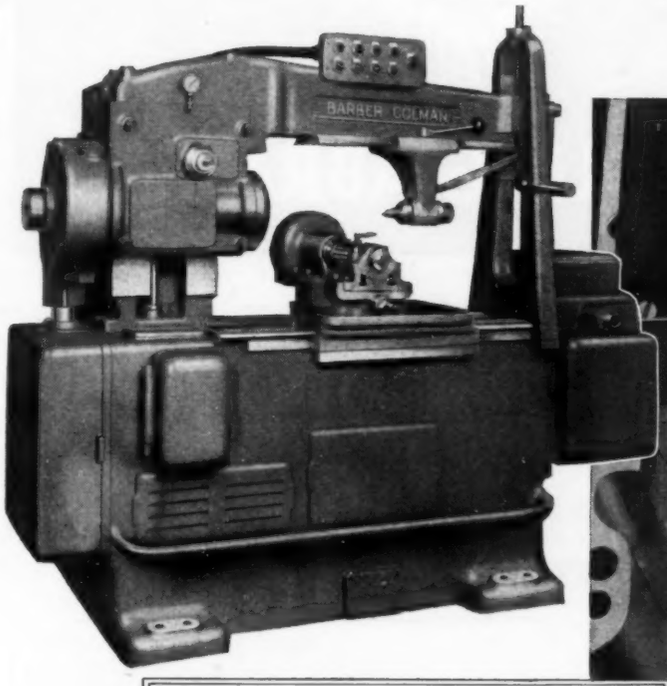
Hobbing efficiency today is determined essentially by the amount of time and effort required of the operator in keeping his machine producing. Maximum efficiency can be reached only when the human element is reduced to the point where many machines can be handled easier by fewer people.

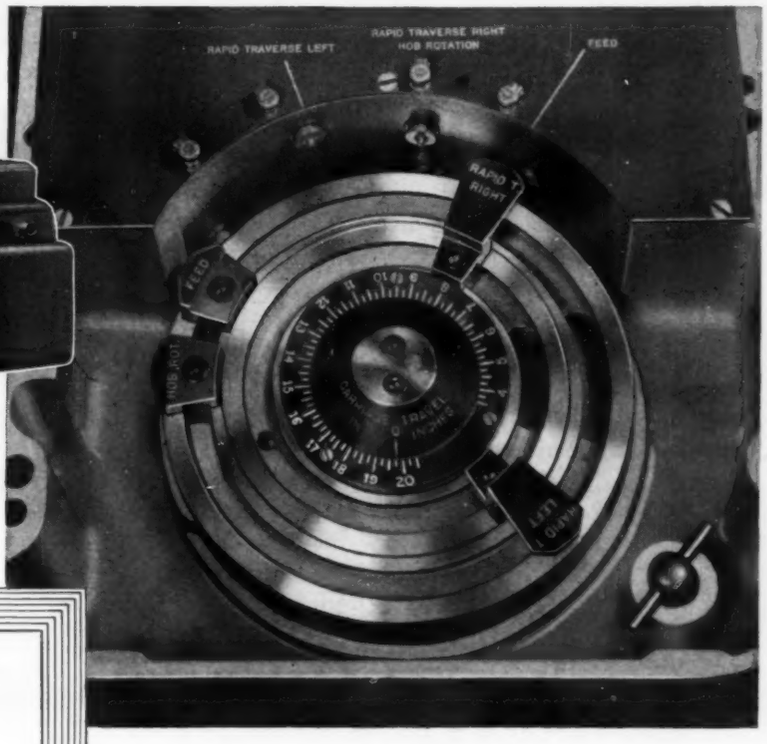
The Barber-Colman No. 16-16 Hobbing Machine features many new operating aids destined to give you this efficiency. For instance . . . the new Dial Stop Selector, shown below, greatly simplifies the feed and traverse settings, for *either* climb or conventional hobbing. The dial is calibrated in inches of travel, so that a simple reading quickly tells the operator exactly where to set his stops for a particular job. The same dial automatically stops the hob rotation at the end of the cut, and a push-button rapid traverses the carriage to the starting position for the next cut. It's that simple — with no hand-cranking or straining to tire the operator.

Investigate the new No. 16-16 Hobbing Machine if you have gears, splines or sprockets ranging up to 16" diameter and 16" face length

Barber-Colman Company

GENERAL OFFICES AND PLANT 122 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.





FEATURES:

- CENTRAL PUSH-BUTTON CONTROLS
- DIAL STOP SELECTOR
- CLIMB OR CONVENTIONAL CUT
- BACKLASH ELIMINATOR
- RAPID TRAVERSE EITHER DIRECTION
- HOB ROTATION SELECTOR
- HEAVY-DUTY CONSTRUCTION

BARBER COLMAN · A COMPLETE HOBBING SERVICE

Metal Parts Deburred 4 Times Faster

with ALUNDUM TUMBLING ABRASIVE!

A WELL-KNOWN manufacturer of hack saws thoroughly deburrs 1500 steel hack saw levers in three-and-one-quarter hours, by tumbling them with ALUNDUM Abrasive. Previously, with conventional hand-deburring methods, it required over twelve hours to deburr the same quantity of parts! By taking advantage of precision tumbling and ALUNDUM Abrasive, this manufacturer obtained cleaner, better-deburred parts, and saved both time and money.

ALUNDUM Tumbling Abrasive is an ideal medium for tumbling operations used to deburr, to remove scale, paint and plating, and to improve finish. It's **all abrasive** for a continuous cutting action. It's **heavy** for a fast, positive cut. It's **hard and tough** for a long, productive life.

For full details on ALUNDUM Tumbling Abrasive, contact your NORTON abrasive engineer or distributor, or write for a free copy of the fact-packed booklet, "Precision Tumbling with ALUNDUM Abrasive."

NORTON COMPANY
WORCESTER 6, MASS.
Distributors in All Principal Cities

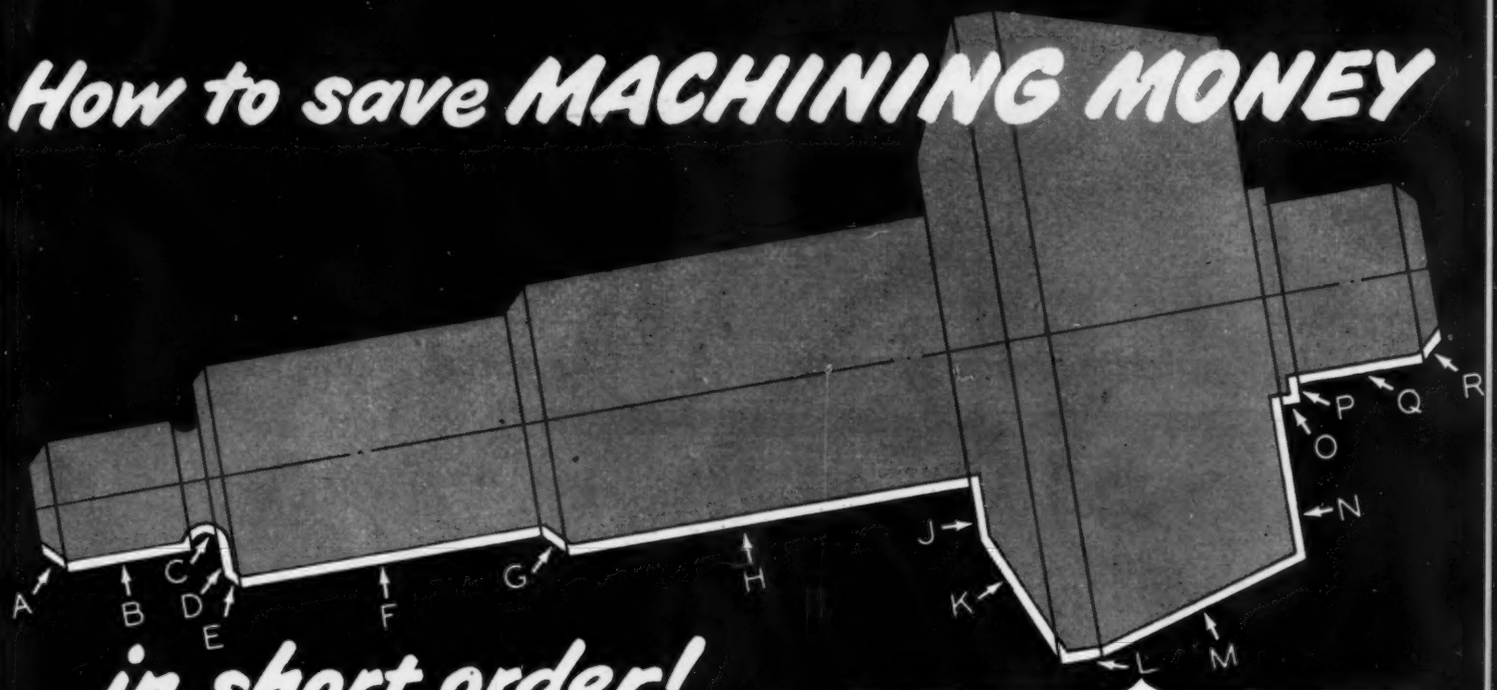
G-197

NORTON ABRASIVES

Ideal for "De-plating"

Occasionally plating jobs prove unsatisfactory. When such is the case—faulty plating must be removed, and the surface must be re-finished prior to re-plating. The de-plating and re-finishing of many metal parts may be accomplished quickly, easily, and economically—**in one operation**—by tumbling them with ALUNDUM Abrasive.

How to save MACHINING MONEY



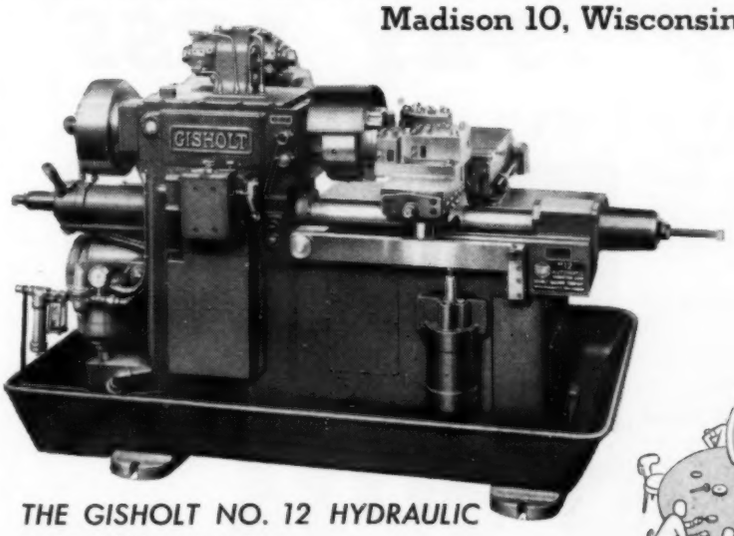
in short order!

with 4 GISHOLT HYDRAULIC AUTOMATIC LATHES

They're drive pinions—turned out in record-smashing time. This production set-up does the entire job, machining 17 surfaces in rapid, pass-along sequence at the rate of 55 pieces an hour. Each machine handles one operation, as shown at right. Two men operate all 4 machines—handle production on 8 similar parts. See what this does to costs?

It's one of many ways alert production men are capitalizing on the speed and versatility of this outstanding automatic lathe. Perhaps we can help cut your costs, too.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

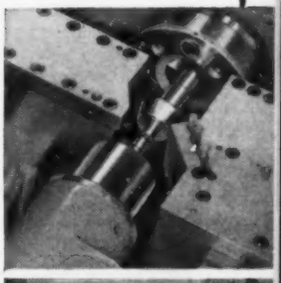


THE GISHOLT NO. 12 HYDRAULIC AUTOMATIC LATHE

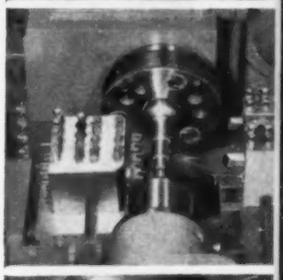
THESE 17 SURFACES

— machined in 4 different operations —
on 8 similar parts in this order

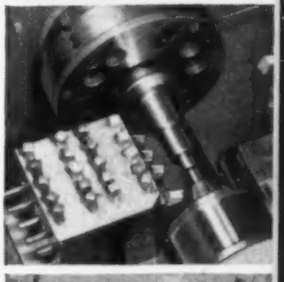
Hold between centers using Gisholt Work Driver.



OPERATION 1—Rough turn Q-M-L with tools on the Front Carriage. Rough face K-N with tools on the Rear Slide.



OPERATION 2—Rough turn B-F-H with tools on the Front Carriage. Rough face D-J with tools on the Rear Slide.

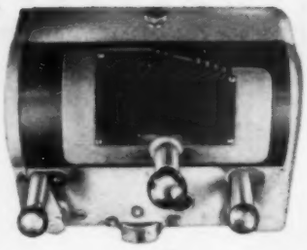


OPERATION 3—Finish turn B-F-H with tools on the Front Carriage. Finish face D and groove C, finish face J, and chamfer A-E-G with tools on the Rear Slide.

OPERATION 4—Finish turn Q-M-L, and face P with tools on the Front Carriage. Finish face K-N, size O, and chamfer R with tools on the Rear Slide.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed.

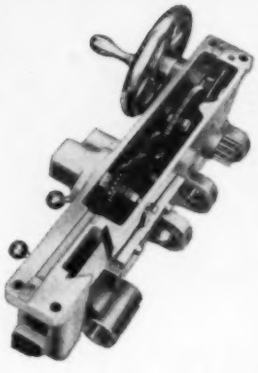
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

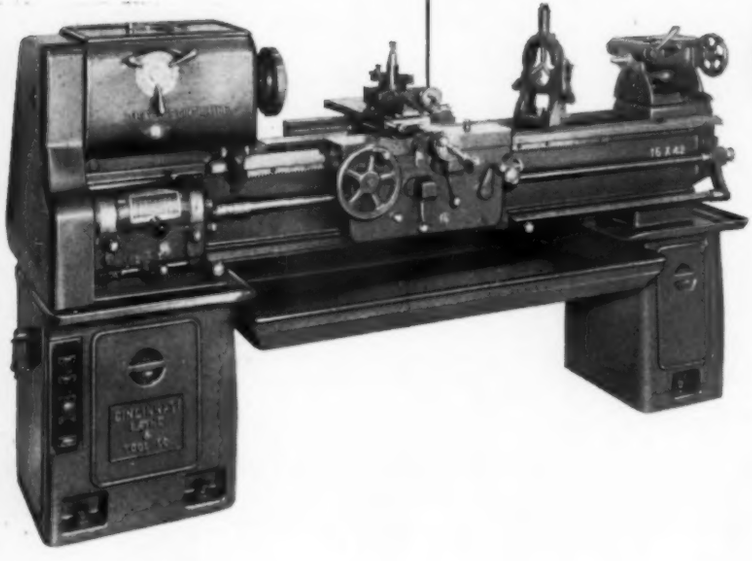


4 3

GET MORE

2 5





The completely new Tray-Top Cintilathe gives you more valuable features than any other lathe in its price class. 10", 12½", 15" and 18" swing sizes. Distance between centers from 18" to 60".

PAY LESS

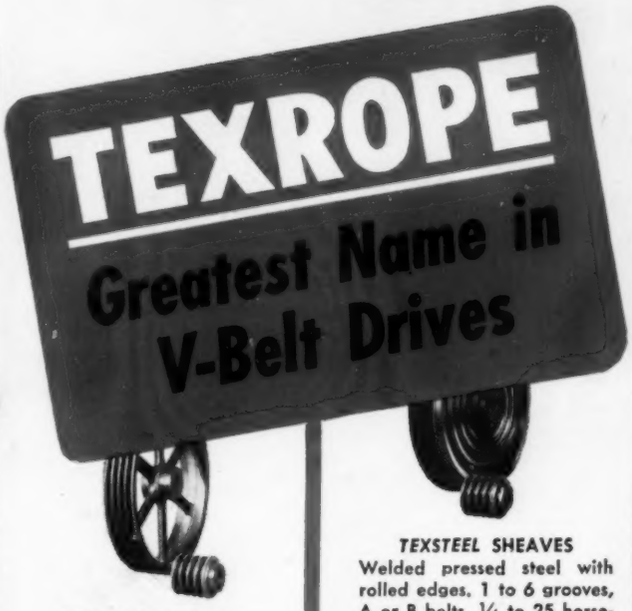
Here are 10 practical reasons for making your next engine lathe a Tray Top: **(1)** Tray-Top on headstock and tailstock provides convenient "parking space" for tools. **(2)** 12 spindle speeds selected by color-coded dial, all geared transmission featuring flame hardened gears. **(3)** 48 thread and feed changes. **(4)** Unusually large spindles – rigidly mounted in precision anti-friction bearings – two on the 10" and 12½" size – three on the 15" and 18" size machines. **(5)** Double wall apron. **(6)** Totally enclosed change gear box. **(7)** Simple unique method of changing from English to Metric thread chasing or vice versa. **(8)** Enclosed electrical panel. **(9)** Optional drive, reversing motor control or multi-disc clutch and brake. **(10)** Cabinet legs . . . 15" and 18" sizes can be furnished with gap and gap block. **WRITE FOR BULLETIN T-100.**

cintilathe

the best buy in its class

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO

Fills Every Need for V-Belt Drives!

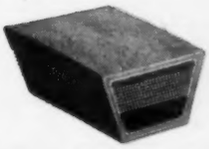


***TEXDRIVE* SHEAVES**
Cast Iron with 1 to 6 grooves for A and B belts. 1 to 25 h. p. *All sizes from stock.*

***VARI-PITCH* WIDE RANGE SHEAVES**
Speed range up to 100%. 1 to 4 grooves, Q and R belts, fractional to 30 horsepower. Delivery good. *Call your nearest District Office or Texrope dealer.*

***TEXSTEEL* SHEAVES**
Welded pressed steel with rolled edges. 1 to 6 grooves, A or B belts, ¼ to 25 horsepower. *All sizes from stock.*

STANDARD CAST IRON SHEAVES
Made to order from stock patterns. 1 to 14 grooves, A, B, C, D, or E belts, 1 to 1000 horsepower. Delivery good. *Call your nearest District Office or Texrope dealer.*



***TEXROPE* SUPER-7 V-BELTS**
Wide range of types, sizes and sections to suit all operating conditions. *All standard sizes from stock.*

***MAGIC-GRIP* SHEAVES**
Semi-steel with patented taper bushing. On and off in a jiffy. 2 to 12 grooves, B, C, or D belts, 2 to 250 horsepower. *All sizes from stock.*

SPECIAL CAST IRON AND STEEL SHEAVES
Any number of grooves for A, B, C, D, or E belts. Up to 6000 horsepower. Delivery good. *Call your nearest District Office or Texrope dealer.*

***TEX-IRON*, SHEAVES**
Light weight single groove sheave for fractional horsepower applications. *All sizes from stock.*

***VARI-PITCH* STANDARD SHEAVES**
Speed range 9% to 28%. 2 to 10 grooves, A, B, C, D, or E belts, 1 to 300 horsepower. Stationary or Motion Control. Delivery good. *Call your nearest District Office or Texrope dealer.*

***VARI-PITCH* SPEED CHANGERS**
Speed range to 375%. 1½ to 75 horsepower. Single handwheel controls speed. Delivery good. *Call your nearest District Office or Texrope dealer.*

Best Delivery in the Industry!

NOW *YOU CAN GET* nearly every standard V-belt drive component from Texrope stocks. Even on non-stock items, Texrope delivery is the best in the industry. And Texrope is the *only* brand that meets *every* V-belt need.

Selecting a drive is as easy as looking up a telephone number in the 144 page Texrope Pre-Engineered Drive book. Covers 90% of all V-belt drives. Write today for Bulletin 20 B 6956 or see your nearest Allis-Chalmers Authorized Dealer or District Office. Also listed in Sweet's.

ALLIS-CHALMERS, 999A SO. 70 ST. A 2546
MILWAUKEE, WIS.

Texrope, Super-7, Vari-Pitch, Magic-Grip, Tex-Iron, Tex-steel and Texdrive are Allis-Chalmers Trademarks.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.

ALLIS-CHALMERS

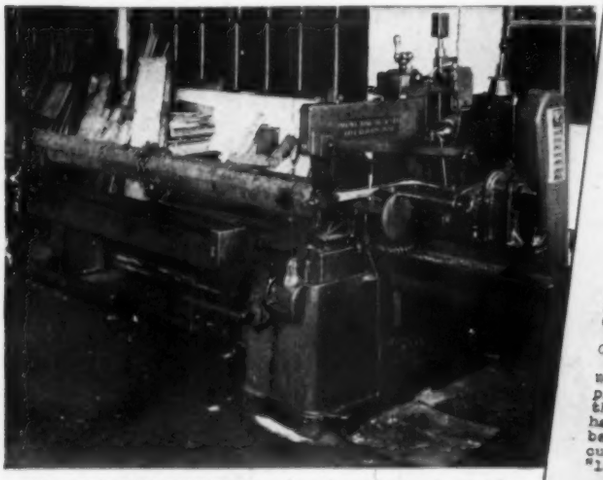
Originators of the Multiple V-belt Drive for Industry

WHICH IS BETTER FOR YOU, HACK SAWS OR BAND SAWS?

Reading Chain & Block Corporation found the answer by contacting the MARVEL field engineer. Only a MARVEL engineer could analyze this problem without bias because only MARVEL makes both hack saws and band saws. As a result, Reading bought three different types to most efficiently handle their metal sawing. A No. 6A machine for production cutting of identical pieces, a No. 4B machine for fast, accurate, miscellaneous cutting, and a No. 8 band saw machine for cutting of structurals, mitering, and other miscellaneous work.

Whatever your metal sawing problem, there is among MARVEL'S 11 different series of sawing machines, a saw or saws that will exactly meet your needs. Your local MARVEL Engineer will gladly study your sawing problems, make recommendations and quote prices.

No. 8 MARVEL Metal Cutting Band Saw. This most versatile saw takes work up to 18" x 18", mortises, miters or roughs to shape.



No. 9A MARVEL Production Saw (world's fastest) automatically feeds, measures and cuts off identical pieces from nested or single bars up to 10" x 10" cross section.

No. 4B MARVEL Hign Speed Saw is a moderate priced, very fast 6" x 6" capacity saw. Here it ideally meets the requirements of the maintenance department.

READING CHAIN and BLOCK CORPORATION

Manufacturers
Materials Handling Equipment
CHAIN HOISTS - ELECTRIC HOISTS - TRAVELING CRANES - MONORAIL SYSTEMS

GENERAL OFFICES
READING, PA., U.S.A.

October 24, 1947

Armstrong-Blum Mfg.Company
5700 West Bloomingdale Avenue
Chicago, 39, Illinois

Gentlemen:

We have in our shop three Marvel Saws which are used all day in production work for the cutting of materials in connection with the manufacture of hoists and cranes. Since these three saws have been used in our plant the cost of cutting materials has been greatly reduced, and the speed at which the materials are cut has been increased to such a point that we no longer have "lay overs" due to the lack of materials.

We wish to assure you at this time that when we need more automatic saws in our plant, we will definitely give you first consideration to install the Marvel Saws in our plant.

Whenever it has been necessary for any repair service, or engineering service, to be applied to these saws, we have never had to wait or inquire the second time for these services. That is one thing that has kept us in production to this date.

Again assuring you that your services and attentions to our requirements have been very satisfactory, we remain,

Very truly yours,

READING CHAIN & BLOCK CORP.

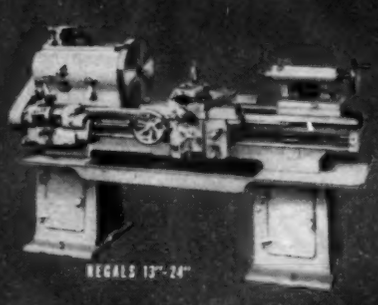
Fred M. Howard

Fred M. Howard
Purchasing Agent

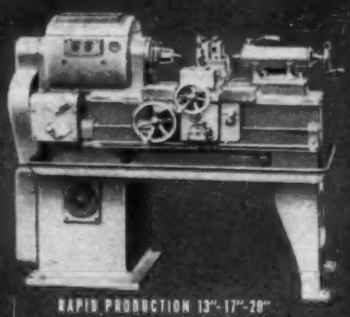
FMHstakh

Metal Cutting
MARVEL SAWS
Better Machines - Better Blades

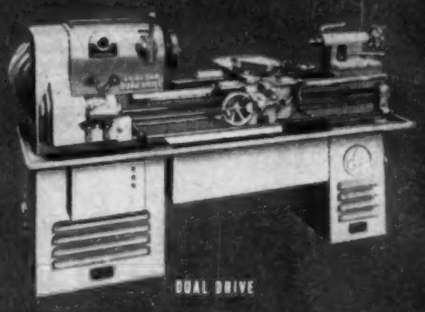
ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago 39, U. S. A



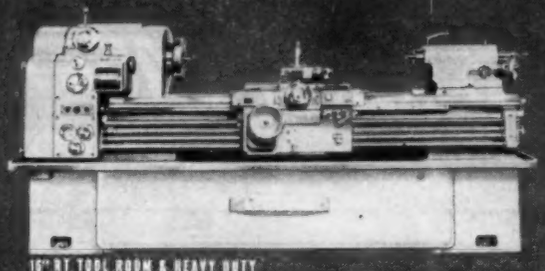
REGALS 13"-24"



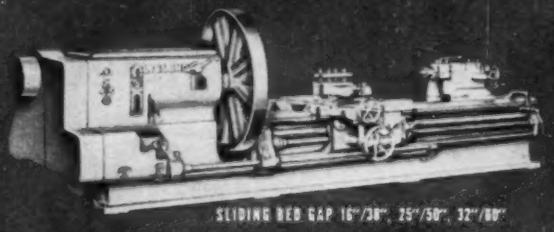
RAPID PRODUCTION 13"-17"-20"



DUAL DRIVE

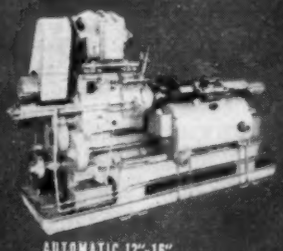


16" RT. TOOL ROOM & HEAVY DUTY

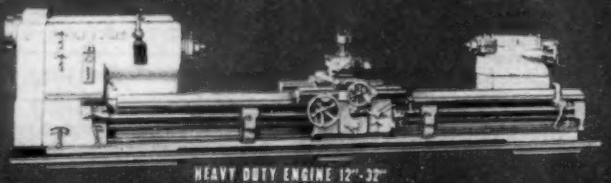


SLIDING BED GAP 16"/38", 25"/50", 32"/80"

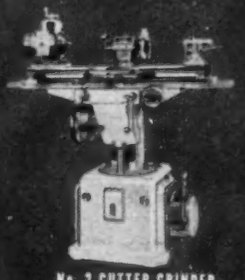
More Lathes mean Greater Choice, Better Buy!



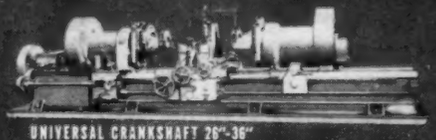
AUTOMATIC 12"-16"



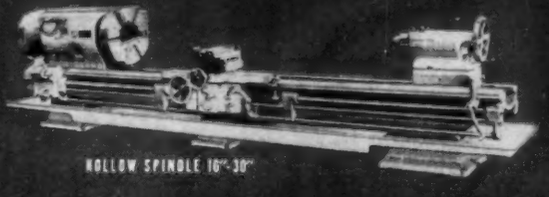
HEAVY DUTY ENGINE 12"-32"



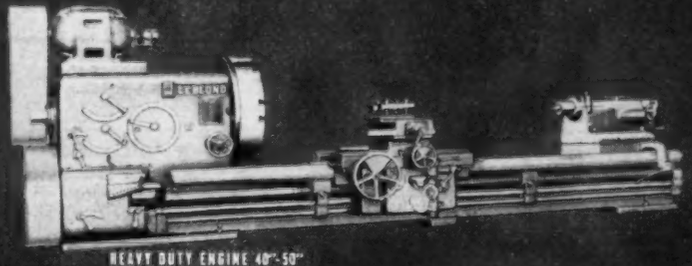
No. 2 CUTTER GRINDER



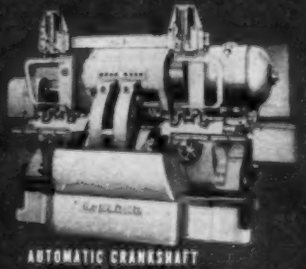
UNIVERSAL CRANKSHAFT 26"-36"



HOLLOW SPINDLE 16"-30"



HEAVY DUTY ENGINE 40"-50"



AUTOMATIC CRANKSHAFT

THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

NEW YORK 6, N. Y., Singer Bldg., 149 Broadway, COurtland 7-6621

CHICAGO 6, Ill., 20 No. Wacker Drive, STAte 5561

PHILADELPHIA 40, PA., Beury Bldg., 3701 N. Broad, SAgamore 2-5900

DETROIT 7, MICHIGAN, New Center Building, TRinity 3-5561

LeBLOND

What a

DE LAVAL CENTRIFUGE REMOVES

FROM 10 FACTORY OILS

—AND THE RESULT IN EACH CASE!

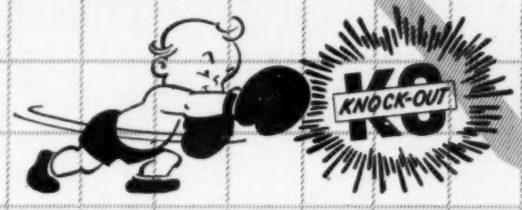
KIND OF OIL	DE LAVAL CENTRIFUGAL OIL PURIFIER removes	RESULT
CUTTING OIL	Grit Metallic Particles Water	Oil can safely be re-used indefinitely Less dermatitis Increases tool life
DRAWING OIL	Scale Metallic Particles	Saves wear on dies
GRINDING COOLANT	Abrasive Particles Metallic Particles	Saves wheel dressing time Better finishes in less time Likelihood of distorting work decreased
HONING OIL	Abrasive Particles Metallic Particles	Reduces rejects Insures mirrorlike finish
HYDRAULIC OIL BALER OIL	Condensate Solid Impurities	Eliminates rust Saves pumps and control mechanisms Valve sticking minimized Prevents hardening of leather seals
RUN-IN TEST OIL	Metallic Particles Core Sand	Tests are more reliable Oil can be re-used indefinitely with perfect safety
QUENCHING OIL	Scale and Dirt Carbon Water	Increases oil life Eliminates "soft-spots" due to moisture
SHOCK ABSORBER OIL	Metallic Particles Dirt Solid Impurities	Prevents particles causing piston wear Assures correct cushion
SLUSHING COMPOUND	Dirt Dust	Rust-preventing compound can give full measure of protection
WASHING OIL	Metallic Particles Dust Dirt	Prevents work being scored

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

for greater operating efficiency—

DE LAVAL
PURIFIERS and CLARIFIERS FOR FACTORY OILS

Tool Maintenance Costs Come Down...

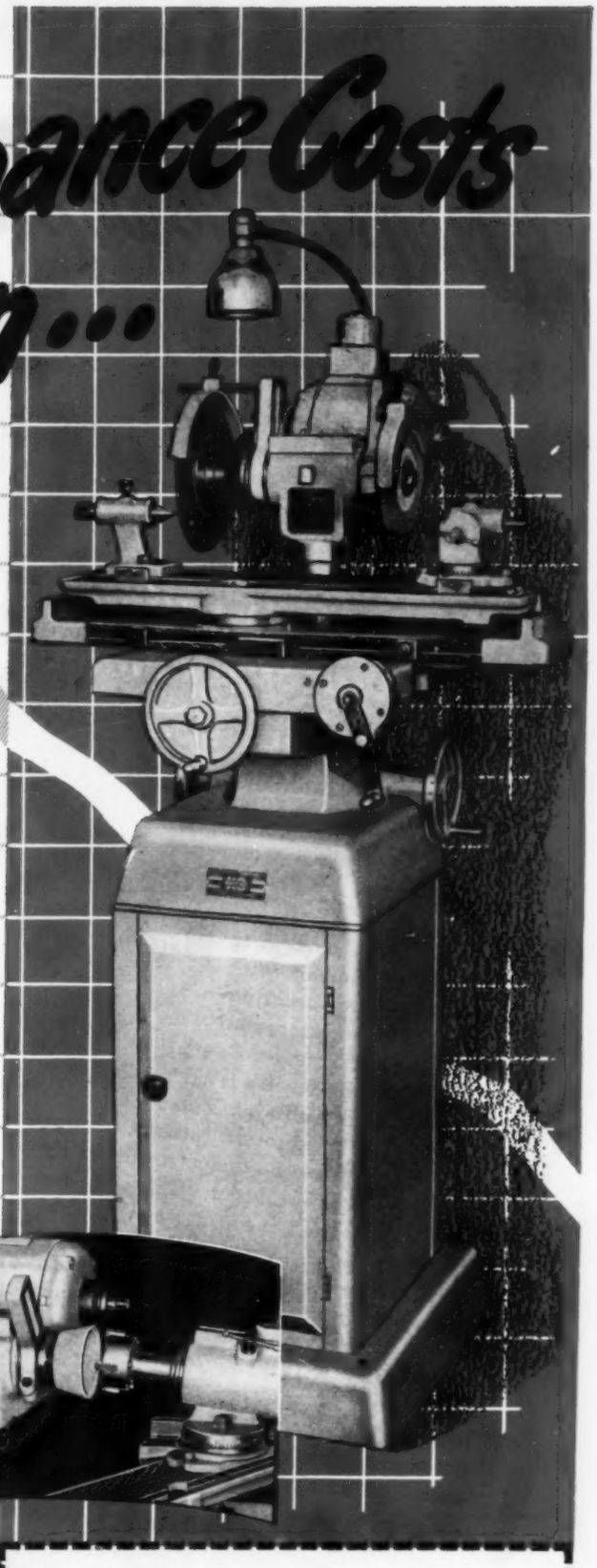


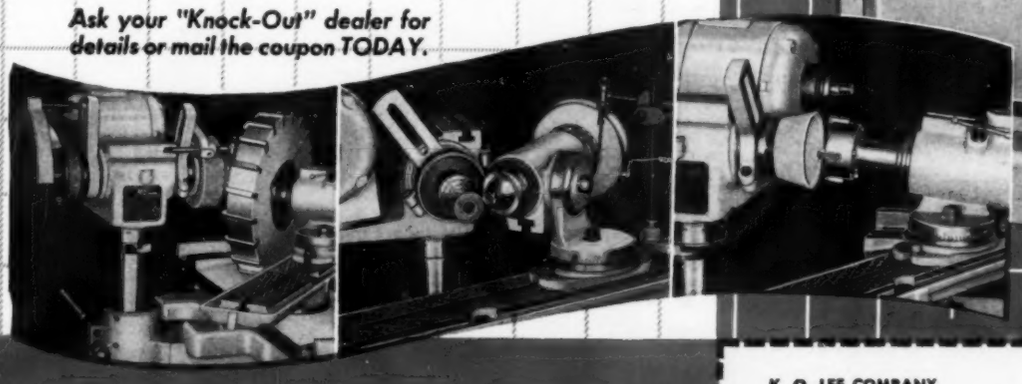
WHEN YOU USE A "KNOCK-OUT" Universal Cutter Grinder

Tool Maintenance Costs Come Down when you use a "Knock-Out" Universal Cutter Grinder.

Set-ups are simpler, easier to make—less time is lost between jobs—more tools of all types can be properly reconditioned at less cost with a "Knock-Out" Universal Cutter Grinder. Handles internal, external and surface grinding too. A "Knock-Out" Universal Cutter Grinder is the busiest machine in *any* Tool Room.

Ask your "Knock-Out" dealer for details or mail the coupon TODAY.





K. O. LEE CO.

ABERDEEN, SO. DAK.

MANUFACTURERS OF MACHINE TOOLS AND AUTOMOTIVE MAINTENANCE EQUIPMENT

10

K. O. LEE COMPANY
1112 First Ave. S. E., Aberdeen, S. D.
Please send us complete details on
"Knock-Out" Universal Cutter Grinders.

NAME_____

ADDRESS_____

CITY_____ STATE_____

are cramped quarters holding your production down?

● Here's a press that gives you maximum production and uses a minimum of floor space . . .

If the walls are closing in on you, interfering with production and boosting costs, you'll be interested in the Verson Transfer Feed Press shown at the right. Designed and built by Verson to provide high production rates, it occupies only a fraction of the space required by conventional equipment. Stock is fed automatically into the press at the right hand side and transferred progressively through each succeeding station until the finished pieces are discharged to a conveyor at the left. This method of production is applicable to the manufacture of coaster wagons, cooking utensils, refrigerator dehydrator pans, stove parts and a host of other concentric or symmetrical pieces.

Verson has poured over twenty-five years' experience into the design of presses such as this and welcomes the opportunity to discuss your stamping problems with you. Remember that in solving stamping problems, it's experience and ability that count—and Verson has both.

VERSON ALLSTEEL PRESS COMPANY

9316 So. Kenwood Ave. ★ Chicago 19, Illinois

Originators and Pioneer Builders of Allsteel Welded Presses

POWER PRESSES ★ CLUTCHES ★ FORGING PRESSES ★ DIE CUSHIONS ★ HYDRAULIC PRESSES ★ PRESS BRAKES

CHECK TOLERANCES

FROM "TENTHS" TO "HUNDREDTHS"

BY SIMPLE TURN OF GRADUATION SELECTOR

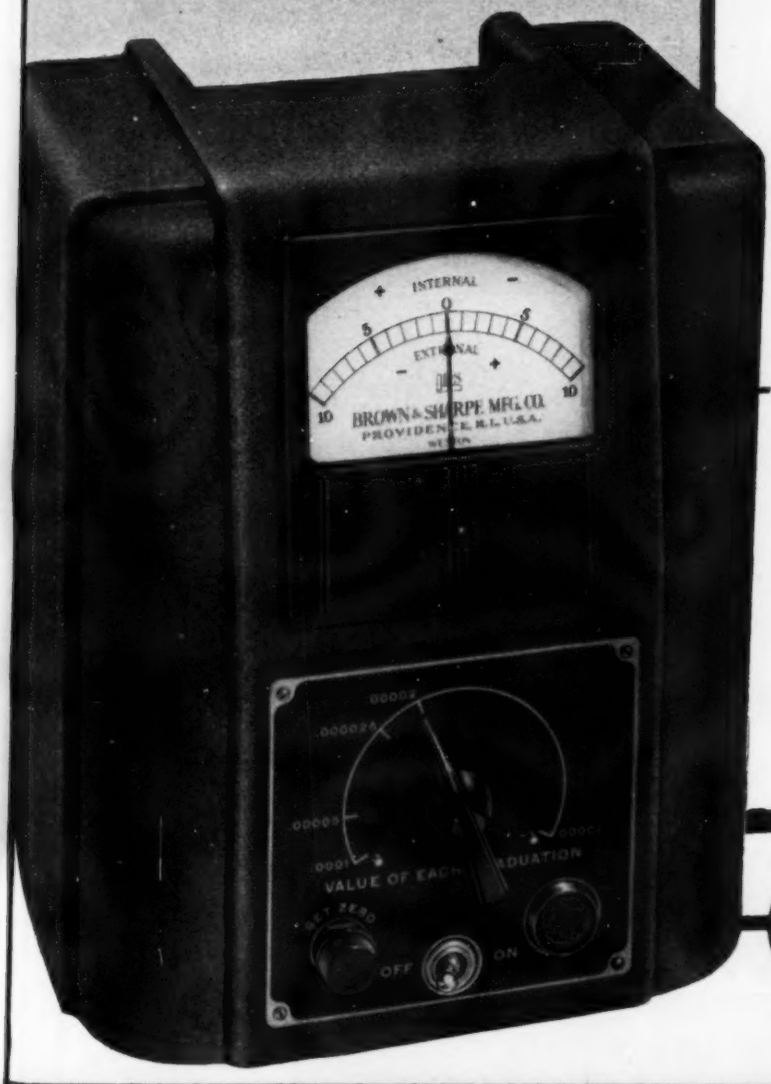
Only Brown & Sharpe Electronic Measuring Equipment offers this advantage

By the simple turn of a graduation selector, you get accurate readings in the desired increment from .0001" to .00001", on Brown & Sharpe Electronic Measuring Equipment. No further manipulations! The amplifier unit below shows the range. In addition, intermediate settings can be made easily to match prescribed tolerance limits.

The *true linear response* of the amplifier permits accurate calibration of scale graduations. Its versatility particularly simplifies special applications in production inspection and sorting devices.

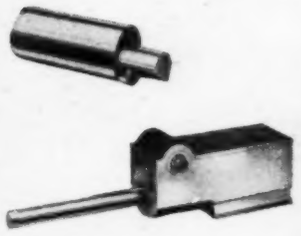
Other exclusive advantages of Brown & Sharpe Electronic Measuring Equipment include a simple, self-checking device on the External Comparator . . . no gage blocks needed . . . and a constant zero setting regardless of changes in increments of measurement. Investigate all advantages of this quality-control aid. Write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor



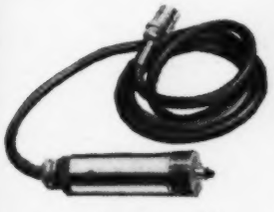
External Comparator
No. 951

Range, 0-4". Simplified setting. One master only. Reversible anvil. Self-checking. Shock-protected. Diamond gaging point.



Internal Comparator Attachment No. 952

Range ½" to 2". Frictionless. No pivots to wear. One master only. One measuring point and measuring bar serve any plug.

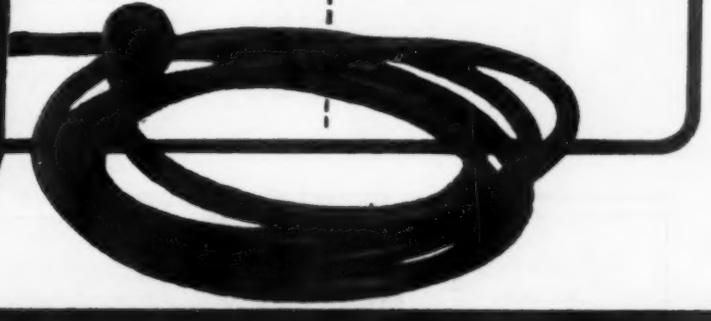


Gage Head Cartridge
No. 953

For mounting in jig or fixture. Its range of measurement is .002" with a small added over-travel which measuring point makes. Frictionless. Dust and moisture proof.

Signal Light Attachment
No. 958

Optional Equipment. Speeds operations. Provides visual indication of work size. Easily and securely attached.



BROWN & SHARPE

Warco *Presses Can't be Beat where Economical Production is Essential*

Warco Presses are designed and built by specialists with years of press experience. They are manufactured under facilities recognized throughout the industry as being the finest in the nation. These are reasons why Warco Presses set the pace where economical maintenance-free press operation is required.

The Lustron Corp. selected their machinery with an eye to mass production at minimum costs. That's why approximately 80 giant Warco Presses—like the one featured in Life—are working around the clock at Lustron's huge Columbus, Ohio, plant.

RESISTANCE WELDERS FOR EVERY APPLICATION • FROM 50-TON OBI TO 2000-TON DOUBLE ACTION

Federal WELDERS®

THE FEDERAL MACHINE AND WELDER COMPANY
Dept. 1128, Warren, Ohio • • Offices in Principal Cities

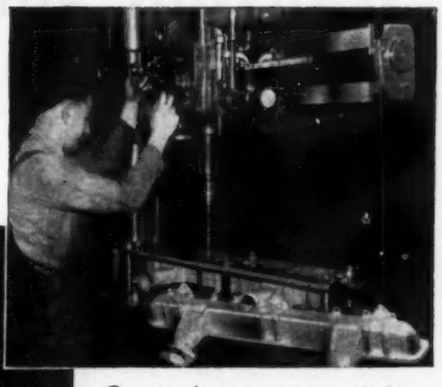
Warco PRESSES®

HIGHLY PRODUCTIVE

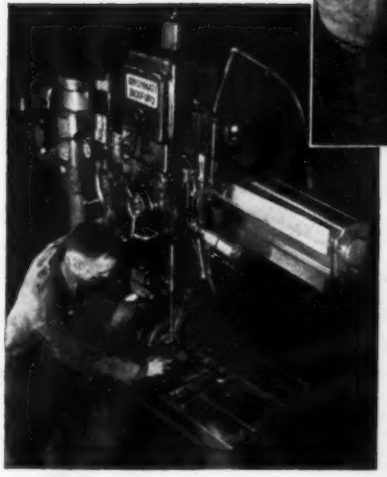
High speed brought profit on these jobs. These quiet, smooth, Cincinnati Bickford High-Speed Super Service Drills are equipped with modern, easy controls—all centralized on the head, at the operator's hand. They give long, trouble-free performance.

Every operation conveniently controlled—nine spindle speeds controlled by one lever—dials large and easily read—arm swings with a finger-tip ease—automatic lubrication, and many other features to give the greatest ease of performance.

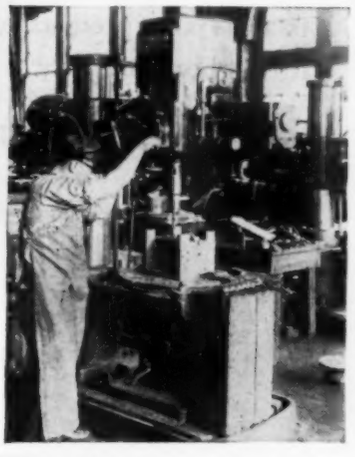
Write for Bulletins R-26A and R-21B.



Due to the construction of this machine, long drills are used with accuracy.



This Super Service Radial reduced the time on this job from thirteen minutes to five minutes.

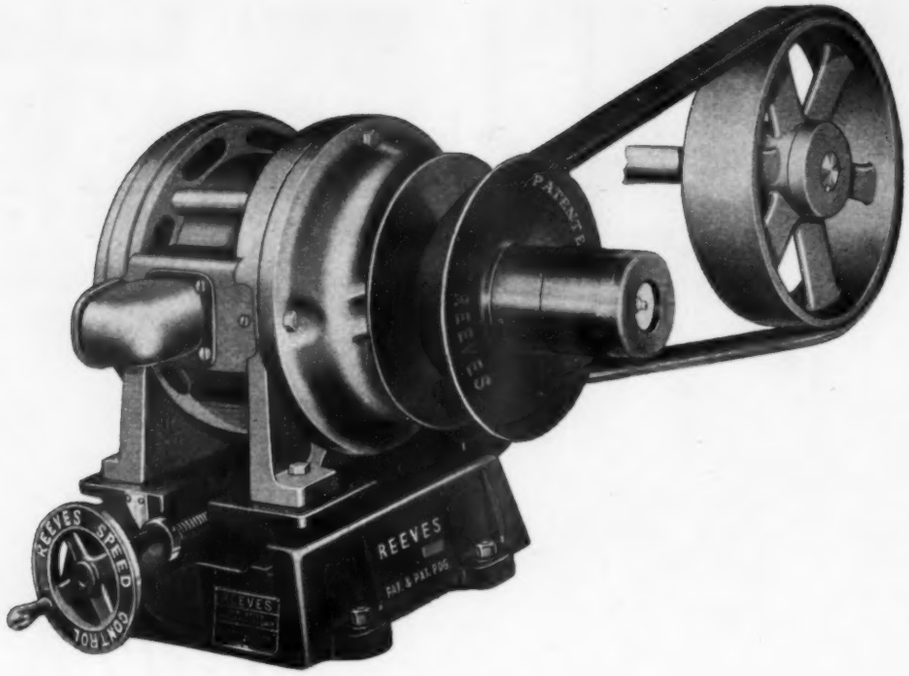


On this job a universal table increases speed of production.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**



Reeves: a name synonymous throughout industry with accurate, variable speed control

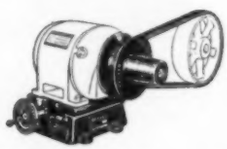
In the plants of some 25,000 manufacturers and processors you will find, today, more than 260,000 production machines equipped with infinite, stepless REEVES Speed Control. On the blueprints and catalogs of machine manufacturers you will also see more than 2,100 different makes of machinery calling for REEVES Variable Speed Drives as standard equipment. And, if you'll take a look at the record, you'll soon discover why REEVES is thus accepted as a name synonymous throughout industry with accurate, variable speed control. For the record shows that in the specialized field of speed control engineering no other manufacturer equals REEVES . . . either in design, manufacturing and application experience . . . in number or variety of installations . . . in dollars-and-cents savings to the user . . . in completeness of line . . . or in the quality of service rendered those who build and use REEVES-equipped machines. Write for 114-page catalog, A12-450A.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

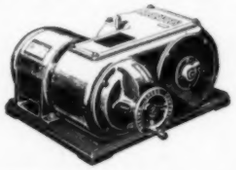
Recognized Leader in the Specialized Field of Speed Control Engineering

THE THREE BASIC REEVES SPEED CONTROL UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.



VARI-SPEED MOTOR PULLEY converts any standard constant speed motor to a variable speed drive within 4:1 ratio. Sizes to 15 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single compact unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 15 hp.

Accurate Variable

REEVES Speed Control

Gives the Right Speed for Every Job!

SPOT NEWS OF METALWORKING

Some screw manufacturers are making screws out of steel instead of copper because of the high price of copper.

Production cost in plants in small cities is 80 percent of that in plants in larger cities operated by one metalworking company making consumer goods. Result: company has acquired new plants, each less than 100,000 sq. ft. in two small communities.

Look-ahead in steel: prominent user of sheet steel expects to get 7 percent more tonnage in 1949 than this year. But 35 percent will be at a premium price, mostly conversion deals.

New slant on precision work—certain company sought subcontract on jet engine parts. Asked what experience they had had in manufacture of such parts, they proudly said "steel beer barrels."

Clue to automotive design trends: new Chevrolet will weigh 125 lb. less than current model. Buick will have slightly shorter overall length. Chrysler will have more head room inside.

British Columbia may reverse its decision to ship iron ores to new electric furnaces being built in the state of Washington on the grounds that the ore is needed for home consumption.

Oldsmobile plans to double the size and output of its new Kettering engine plant. It hopes to build in 1949 some 200,000 cars, of which about two-thirds will be the new high-compression eight. Sometime during '49 the new 135-hp. engine will be offered in the series "76" chassis. The new car will be known as the series "88" and will be priced lower than the series "98" (Futuramic).

Problem of what to do with production machines built for Soviet-controlled countries and now embargoed will be discussed in January by a new machine tool advisory committee being set up by the Office of International Trade, Department of Commerce.

New "no-lash" hydraulic-adjusted valve lifters are assembled while immersed in an oil bath so that they can be kept clean and uncorroded by acid in workers' perspiration. Bath is made antiseptic by suitable chemicals to avoid skin irritation.

New low-cost British process for alloying carbon steel surfaces with chrome to produce high-temperature, corrosion-resistant metal is being introduced in this country by Fusion Alloys Corp., New York City. Steel is packed in carburizing boxes and filled with a chromium-rich powder. It then is heated to 1850 deg. F. Pilot plant is being installed now.

Italian-built textile machinery is being purchased by Southern mills on a three-months' delivery basis. First shipments to this country, however, went to a Pennsylvania textile firm.

Cadillac's new high-compression overhead valve engine has reversed trend from small bore and long stroke to large bore and short stroke. New engine develops 10 hp. more and weighs 22 percent (200 lb.) less than old. Thermal efficiency is so great that size of radiator is smaller (14 lb. less copper).

Gaging Metalworking

There has been a bit of a letdown in metalworking operations as the year-end approached. Still, output stays remarkably high; and the outlook for the first quarter of 1949 is for a continuation of activities at about the current level.

▸ It is true that soft spots have shown up here and there, especially in some consumer-goods lines. But, on a national scale, these evidences of weakness are not too serious. Production is rapidly catching up with pent-up demand. In refrigerators and stoves, last of the household appliances to remain in a seller's market, the turn-around to a highly competitive situation is almost at hand.

▸ The thing to remember is that consumer buying power still is at an all-time peak. And arrival of a buyer's market does not foreshadow a real slump in business. Manufacturers of many consumer products, after having measured demand for next year, are counting on big business through the first half of 1949, and probably longer.

▸ As competition increases and buyer resistance grows, a constantly increasing number of companies are redesigning their products to give the user more for his money. The resultant retooling helps machinery builders, too.

Machine Tool Spurt

A number of machine tool builders will wind up December with a very good month's business. In certain cases the orders have come as a windfall. Timken, for example, placed some $2.5 million of machines to be delivered before the year's end. Export sales are better. Substantial orders are reported by several companies from European sources: Sweden, Denmark, Holland, Belgium, Britain and Italy. There is nothing in connection with some of the orders to indicate that they are of ECA origin. Certain Italian orders, in fact, are being financed by the Export-Import Bank through loans made months ago. The machine tool purchases arising from this loan are just now sifting through. Of the $56 million of machine tools to be bought in the United States for ERP countries, about half has been allocated to Italy and Britain, divided almost equally between them.

▸ Thus far France has earmarked around $3 million to be spent for American machines. Austria and eventually western Germany should be good sources for machine tool orders through ECA. In at least one case, a European customer tried unsuccessfully to place a machine tool order contingent upon the builder's acting as a broker here to furnish with the machine raw materials such as pig iron which the customer badly needs.

▸ Though most machine tool builders will accept ECA orders at face value, a few may ask for safeguards in the contracts. They remember only too well the recent fiasco involving machines built for Russia or her satellites which could not be shipped after completion. The feeling has now pretty well saturated the machine tool industry that ECA will not be the rich source of orders indicated earlier.

Aircraft Tooling Helps

A modest amount of machine tool business has originated recently in the aircraft tooling program. General Electric has placed sizable orders and big purchases are pending for the Kansas City plant of Westinghouse. Ranger Aircraft is reported to have bought over $1 million of machine tools. In addition to these companies, the list of prime contractors for the Air Force authorized to purchase machine tools includes: A. C. Spark Plug at Milwaukee, Bendix Products, Boeing, I.T.E. Circuit Breaker, A. O. Smith, Solar Aircraft, Heintz Mfg. Co., Cleveland Pneumatic Tool, Douglas Aircraft, North American Aviation and Thompson Products.

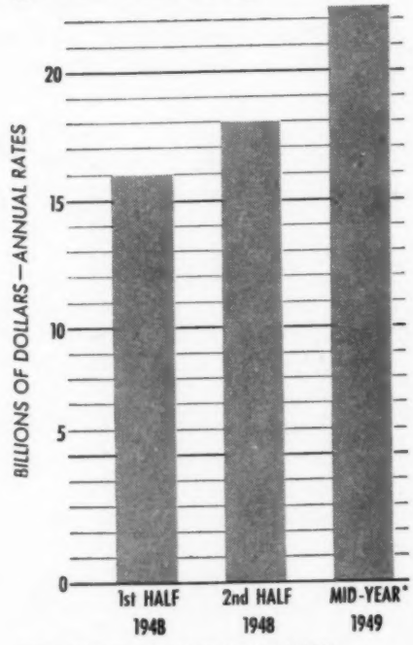
The number of new machine tools to be bought for the aircraft program will be cut down by the government's policy of withdrawing from storage as many surplus machines as possible. Also the government is trying to locate subcontractors who have in their plants as much suitable machinery as possible, thus minimizing the new machine tool requirements for the project.

Shipments Mount

Revised estimates put the machine tool industry's total shipment for 1948 at $285 million as against $306 in 1947. Measured in 1939 dollars the volume is believed to be equal to about $185 million. That is equal to the peak prewar year, but still uses

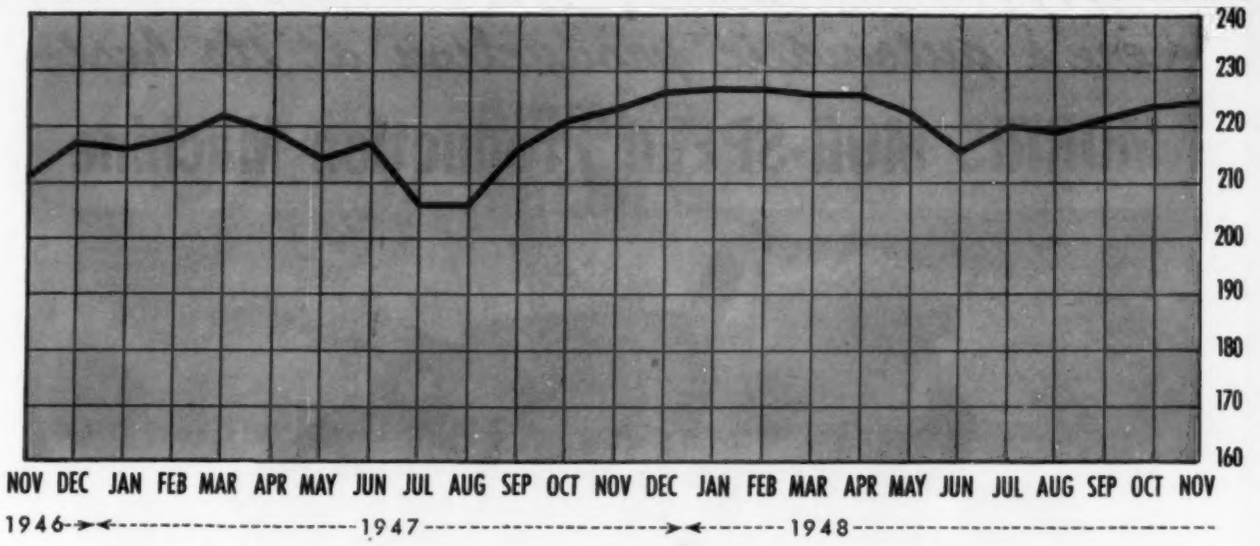
ECA, Military Programs Mounting

***INDUSTRY** is yet to feel the full impact of military and foreign aid programs. To reach the goals set for the fiscal year, both must be stepped-up in the first half of 1949. The increase necessary in billion dollars is shown in the chart.*



DATA: COUNCIL OF ECONOMIC ADVISERS
*ESTIMATED McGRAW-HILL DEPT. OF ECONMICS

American Machinist INDEX OF METALWORKING PRODUCTION



INDEX	COMPONENTS				
	MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
Nov. 1948..... 224	250	236	223	311	159
Oct. 1948..... 223	250	235	223	311	155
Nov. 1947..... 223	244	244	227	293	154

AMERICAN MACHINIST'S INDEX OF METAL WORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1 Index figures are a percentage of 1939, which equals 100.

less than half of the industry's current capacity.

▸ Biggest piece of domestic business at the moment, aside from the defense project, is the new tooling program at Oldsmobile Division, General Motors. Large orders have been awarded machine tool builders in connection with doubling the capacity of the Kettering engine plant.

Tool, Die Business Holding

Tool and die shops did about the same business in the first 10 months of this year as in the comparable period of 1947. The physical volume probably was larger than a year ago, because the price level is believed to be lower than it was then.

▸ Production has been at the expense of backlogs, however. Today the amount of unfilled orders is less than half what it was 24 months ago. The pressure for deliveries is so great that a slightly longer work week is reported, despite the decline in new orders.

▸ Backlogs add up to less than six weeks of work at the October rate. And they are erratically distributed. Some shops have hardly any business at all on hand.

In keeping with the decline in activities, some 52 shops in a recent canvass stated that the outlook is either excellent or good, whereas 130 viewed it as fair or poor.

▸ Just at the present there is a marked lack of retooling programs "in the works."

Gas Appliances Boom

Sales of gas ranges, gas refrigerators, gas water heaters and gas space heaters reached all-time highs in 1947 and 1948. Despite these sales records, manufacturers in many cases were prevented from meeting demands and reaching higher sales and production saturations by the lack of sufficient quantities of high-grade enameling sheet steel and the lack of steel pipe. Industry executives see no limit to the expansion which gas appliance and equipment manufacturers and their dealers can attain. Material shortages are expected to hold back the industry from filling the demand in 1949.

Non-Ferrous Market Tight

Primary non-ferrous metals continue tight, with the only bright spot being the tendency of most copper operators to discourage talk of a higher selling basis. Offerings of scrap copper and lead have increased, leading to the belief that dealers were unloading on the assumption that the market is stabilized for some time come.

▸ In the lead picture, operators believe that the scrap flow may indicate a brighter over-all supply picture. Though galvanizers are taking all available Prime Western zinc, the situation in reference to die casting, which involved the top grade, is viewed as a little uncertain, possibly because of high prices.

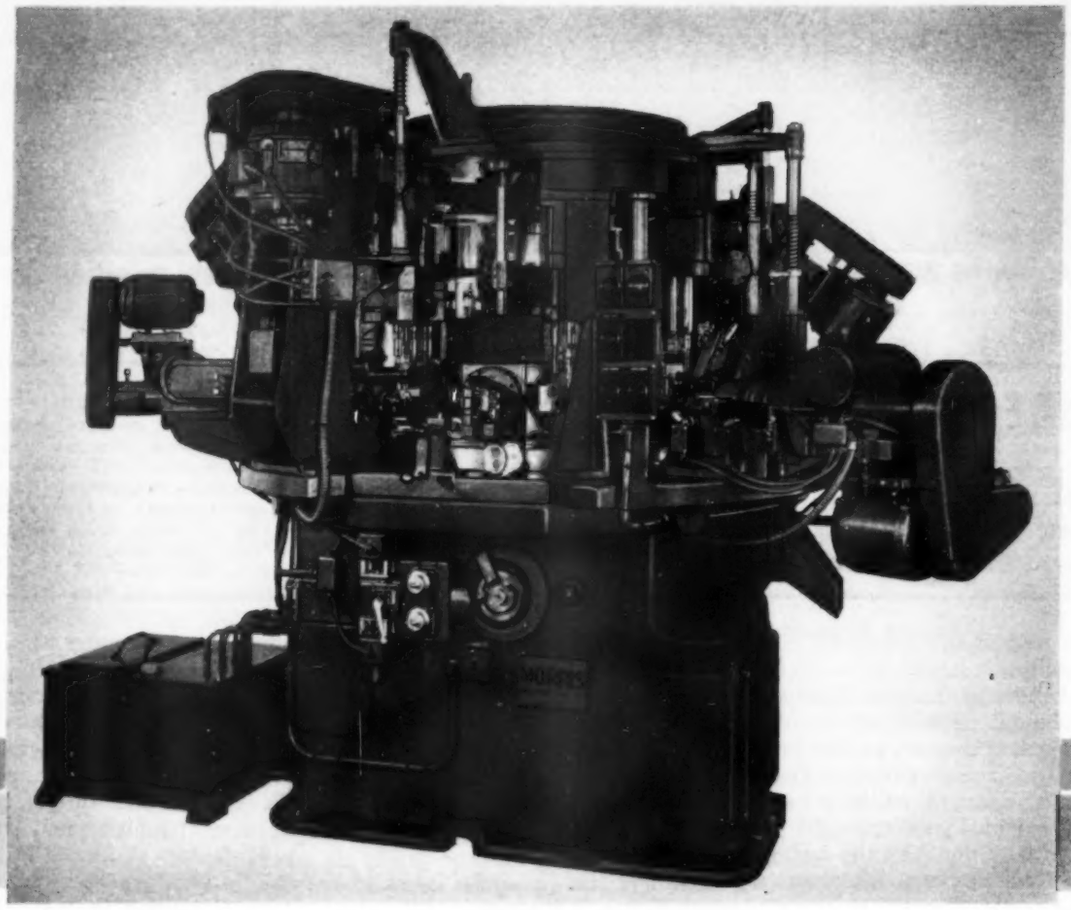
▸ Aluminum continues to tighten, as the largest producer predicted another reduction in customer quotas. Reduced imports from Canada, defense requirements, smaller reserve of scrap and a slipping production due to power shortage are the factors behind that prediction.

Index Up One Point

Activity in the metalworking industry continued to increase during November, according to the American Machinist Index of Metalworking Production. Although up only one point to 224 from the October figure, there has been a steady monthly rise from August's 219. During November, production in the machinery, auto, and other transportation fields was unchanged from October, but output in the electrical manufacturing field showed a one-point advance and the general metalworking category pushed up four points, both of which accounted for the increase in the weighted index (1939-100).

Here's automatic production at its best-

MORRIS MOR-SPEED Production Machine



● On this machine the operator merely loads and unloads the work while machine is operating on the piece. All machine functions including the indexing are automatic.

The machine drills—taps—spot-faces—and reams carburetor main bodies on a mass production basis for a prominent automobile concern.

The machine of vertical design has 12 automatic indexing four position fixtures, 20 drilling spindles, 7 facing spindles, 15 tapping spindles, 1 brush spindle and 4 reaming spindles and turns out a completed piece at every index of the turret.

Here is another typical instance of where Morris developed the machine to meet specific job conditions. If you are interested in the high production of work requiring drilling, reaming, tapping, facing and similar operations consult Morris—they have the experience, engineering ability and facilities to help you.

Write for our Mor-Speed Production Machine Bulletin showing the wide scope of our operations with specialized equipment.

Builders of MOR-SPEED Line

The MORRIS *Machine Tool Co.*

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Mechanical Muscles Are Better

The workman is gone who took pride in his ability to carry heavy objects about the shop for an eight-hour stretch.

But even if he were still with us, management could not afford his services. Labor costs are too high.

Mechanical hands are less expensive. And they actually do the job better. They are untiring and just as productive the eighth hour as the first.

And yet alert management realizes that far too much continues to be done the hard way, and the costly way.

A large manufacturer of both durable and consumer goods tells us that his materials-handling expense adds up to almost one-half his total direct labor cost. An unbelievably high ratio.

His 1949 objective is to cut that cost in two. As an example: he now handles one item by hand fifteen times in process of assembly. He hopes soon to be handling it only once.

Another company aims to reduce the labor content of its products at least four percent in the next year. Part of the savings will be made in substituting mechanical for human muscles.

In its search for new methods to cut production costs, the automotive industry looks to materials-handling equipment as the best hope. With its employees averaging $1.64 per hour, it wishes to minimize the expense of picking things up and putting them down again.

The possibilities are almost limitless, because materials handling embraces all the steps of hauling, lifting, carrying and storing of raw materials, parts, subassemblies and the final product. It encompasses the use of all kinds of mechanical devices—cranes, hoists, conveyor lines, monorails, industrial trucks, and various ingenious handling units.

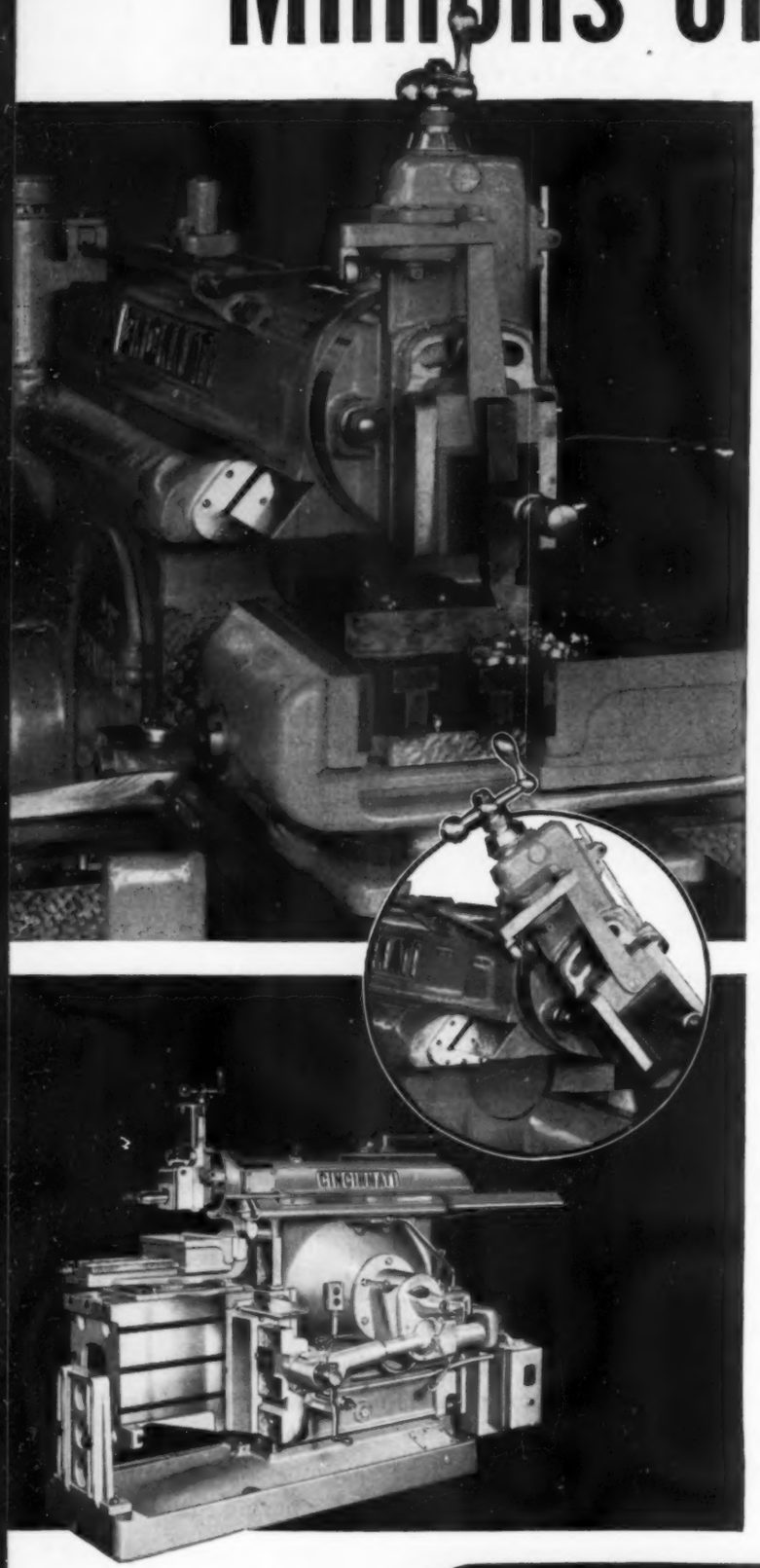
Nearly thirty percent of all payroll costs in American industry go for materials handling. Metalworking is no exception. Until recently about four-fifths of the handling was being done without mechanical aids.

Have you examined the situation in your own shop? If not, you should find out what materials-handling savings can be made. And then keep your eye on the problem constantly. It offers a vast potential in most plants for paring costs.

Burnham Finney

EDITOR

Millions of cuts . . .



with the NEW CINCINNATI TOOL LIFTER

DURABLE

The Cincinnati Tool Lifter, a new development, operates millions of times without a fault. A successful tool lifter must be certain in action on each stroke to prevent tool damage. It must *continue* to be certain month after month, year after year, for millions of operations. The Cincinnati Tool Lifter, with positive return as well as positive lift, is outstandingly successful.

VERSATILE

Efficient at high speeds or low, long strokes or short—dependable at different positions or angular settings of tool slide—or clapper box, the Cincinnati Tool Lifter is truly versatile and productive.

AUTOMATIC

It relieves operators and greatly increases speed of cutting. After simple setting it is automatic.

SPEEDY

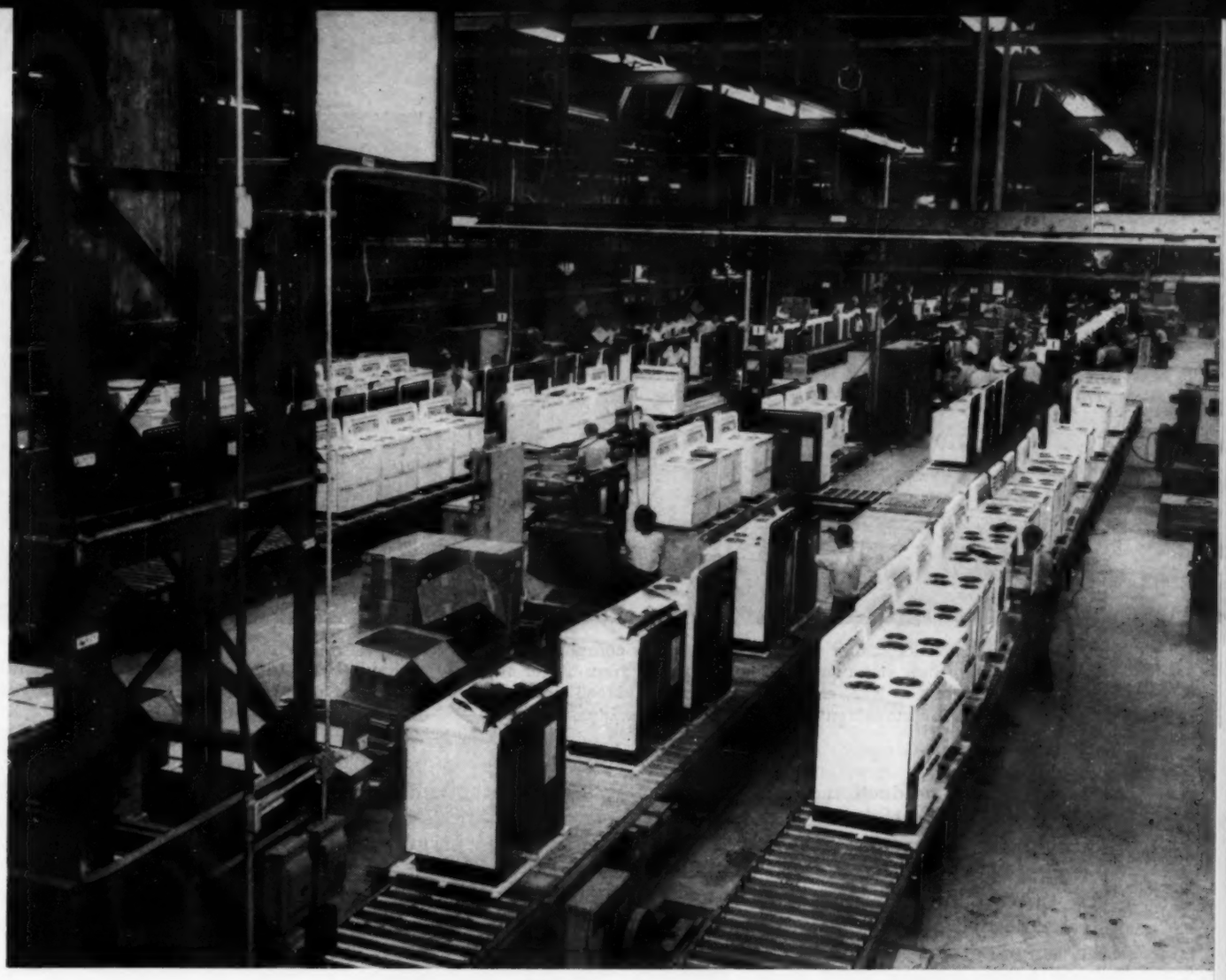
Carbide and high-speed cutting tools both operate to greater advantage when protected by a Cincinnati Tool Lifter.

Write for Catalog N-3.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



Final assembly is performed on four separate lines. At the end of each line, an Alvey automatic elevator lifts ranges to an overhead roller conveyor for delivery to the crating line in the shipping warehouse. Overhead chain conveyors bring major subassemblies to final assembly

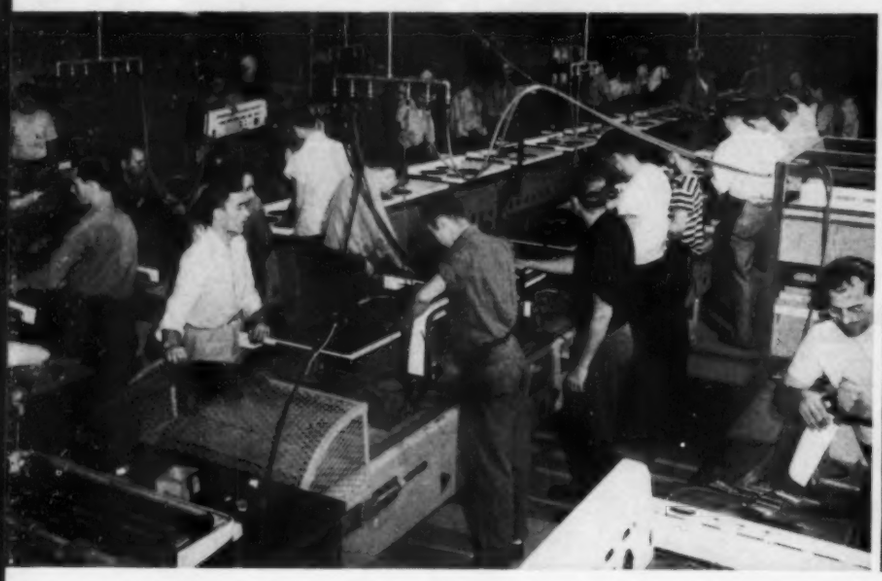
HOTPOINT MECHANIZES RANGE PRODUCTION

Handling equipment is synchronized with production machines for automatic operation as a unit; material movement closely scheduled from receiving through manufacture to shipping

BY BEN C. BROSHEER, ASSOCIATE EDITOR

MATERIAL movements are highly mechanized in Hotpoint's new electric range plant. Covering 1,000,000 sq. ft. and designed to produce 12,000 ranges per week, the new building contains seven miles of conveyors. These are applied both to major production activities, including machining, processing, and assembly, and also to handling tasks, such as carrying parts to assembly and finished ranges to shipping. Workplace arrangements have likewise been carefully planned and numerous automatic feeding devices and transfer mechanisms are employed.

Layout of the plant is such that material is unloaded from freight cars or trucks close to the point where it is needed. Parts

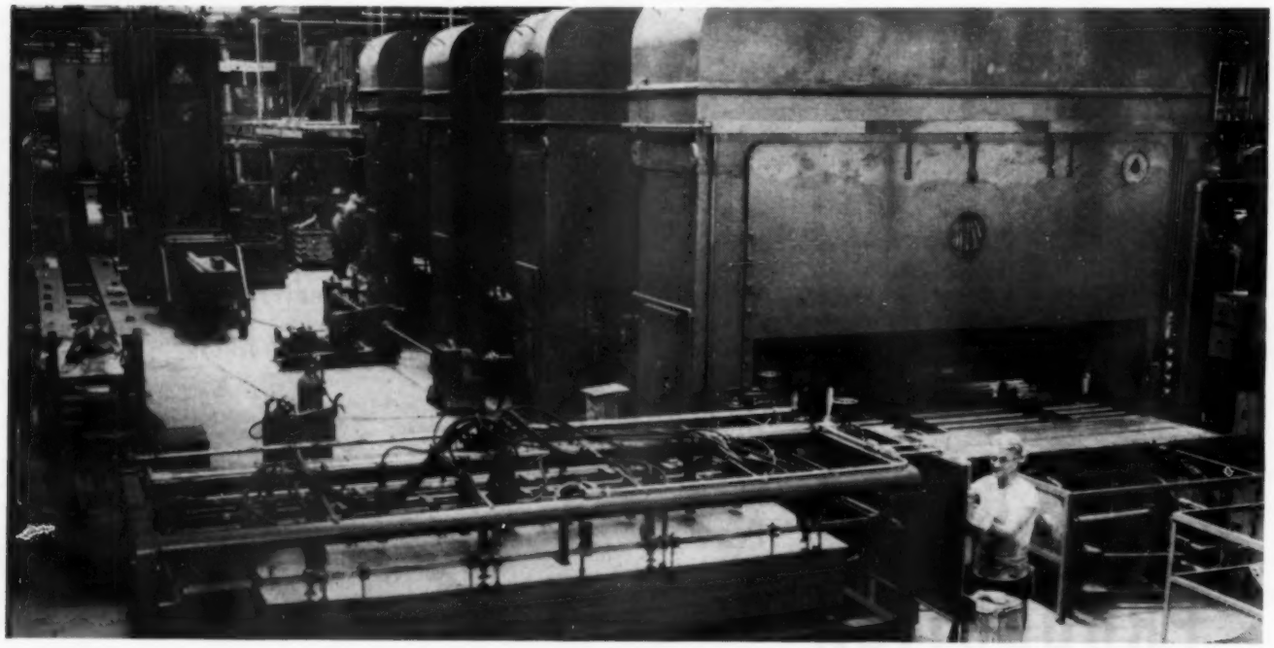


Subassembly of backsplasher and cooking top is completed on four 80-ft. long, 30-in. high slat conveyors moving at 2 fpm. After inspection at the end of the line, completed units are placed on overhead chain conveyors for movement direct to final assembly

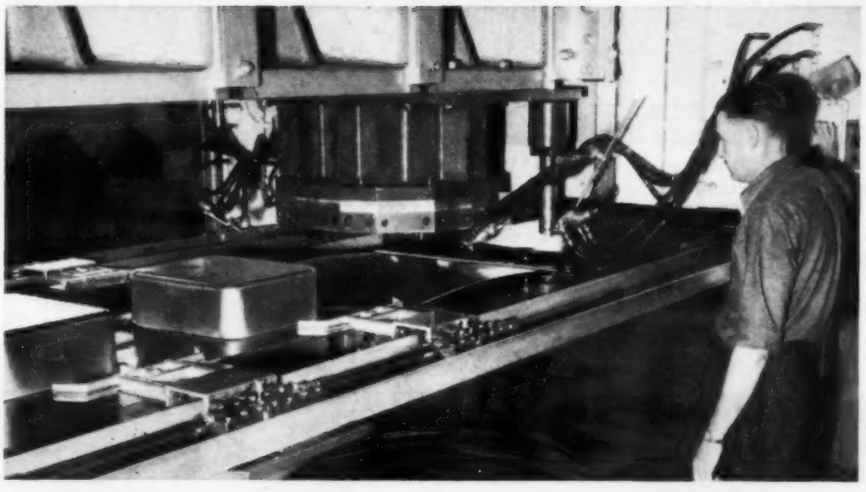
Subassembly clamps are bolted to 6x36-in. steel conveyor slats. Clamps are faced with leather to prevent damage to porcelain-enameled surfaces during assembly and wiring

move through production operations and on to final assembly and test without backtracking or interference. Production operations are so carefully scheduled that steel unloaded at 7:30 A.M. is on the shipping dock as a finished product at 3:30 P.M. the same day. Four separate assembly lines for various range models permit the manufacture and carloading of mixed shipments without intermediate storage in the warehouse.

At full production an average of 16 carloads of incoming material will be unloaded each day, and 32 carloads will be shipped. 4,000 people will be employed and the plant will use as much electric power as a residential community of 30,000.

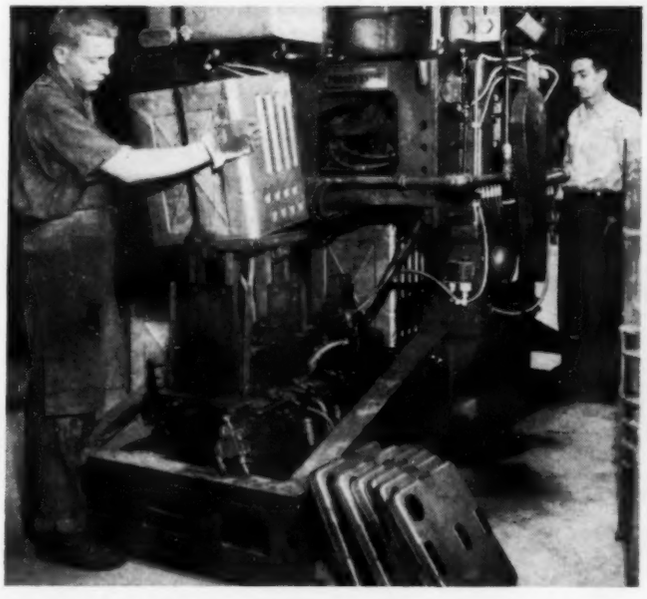


Range body line employs mechanical handling for a series of press and welding operations. Steel sheets automatically are fed to the press conveyor one at a time by the Dexter feeder in the foreground. Properly timed, they pass through a Kane & Roach edge trimmer for pickup by dogs on two drag chains that move intermittently to transfer the sheets to the four presses. First and third presses emboss sheets, second and fourth presses pierce and blank. After the press operations, body sheets automatically are folded to shape and spotwelded. Stiffeners then are tacked in place with gun welders positioned along a roller conveyor that delivers the bodies to tunnel-type resistance welder where body assembly is completed



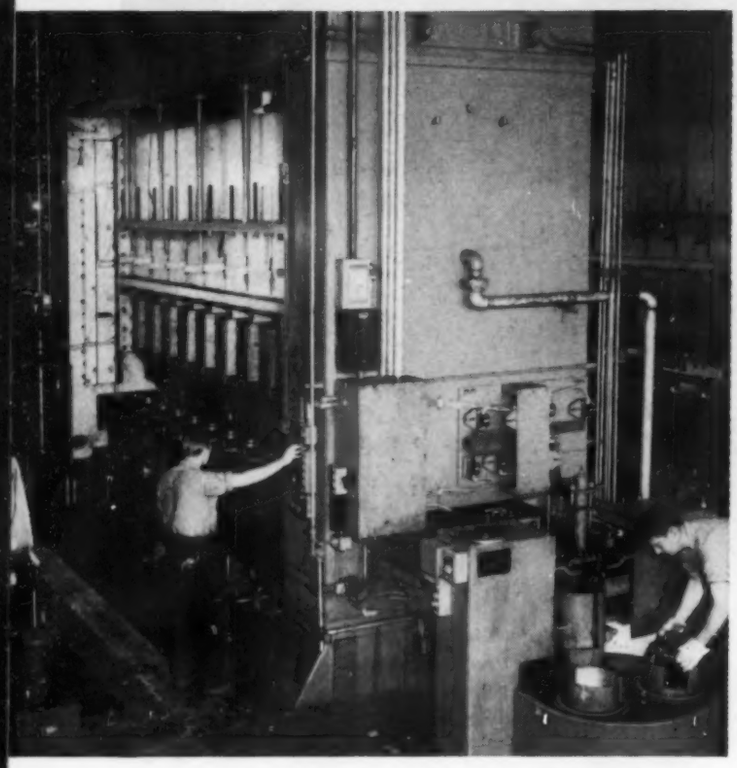
Press for range drawers, 450-ton capacity with 22-in. stroke, has 8 stations and makes drawers in 6 operations. Cradle reel and roll feed units advance steel strip into first station at each stroke. Novel mechanism then transfers drawn part from station to station on each return stroke of ram. Grippers hold the drawer during movement

Range drawer grippers are spring-loaded and shaped to fit the drawer for transfer along the press bed. Four spray heads grouped around the first station spray light oil on the combination blank-and-draw die as press ram returns

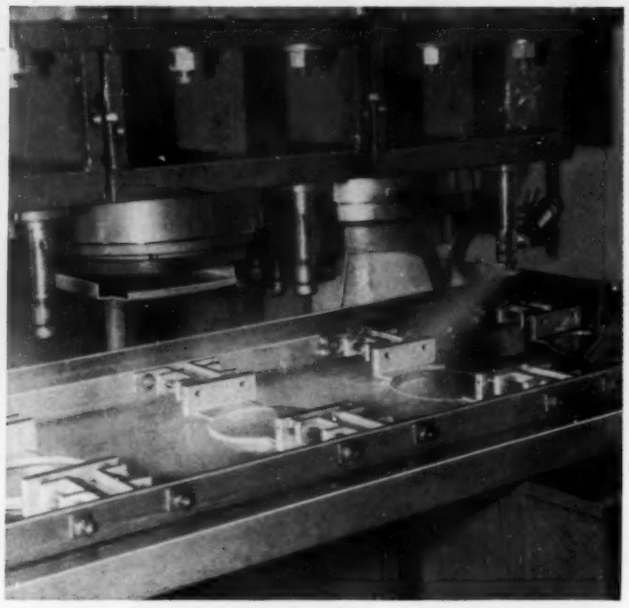


Multiple spotwelder joins oven-liner wall and back end with 40 spotwelds. Shuttle table has two air-operated expanding fixtures, so one assembly can be welded while a second set of parts is being mounted on idle fixture. Parts are held in place with air clamps during movement of shuttle table

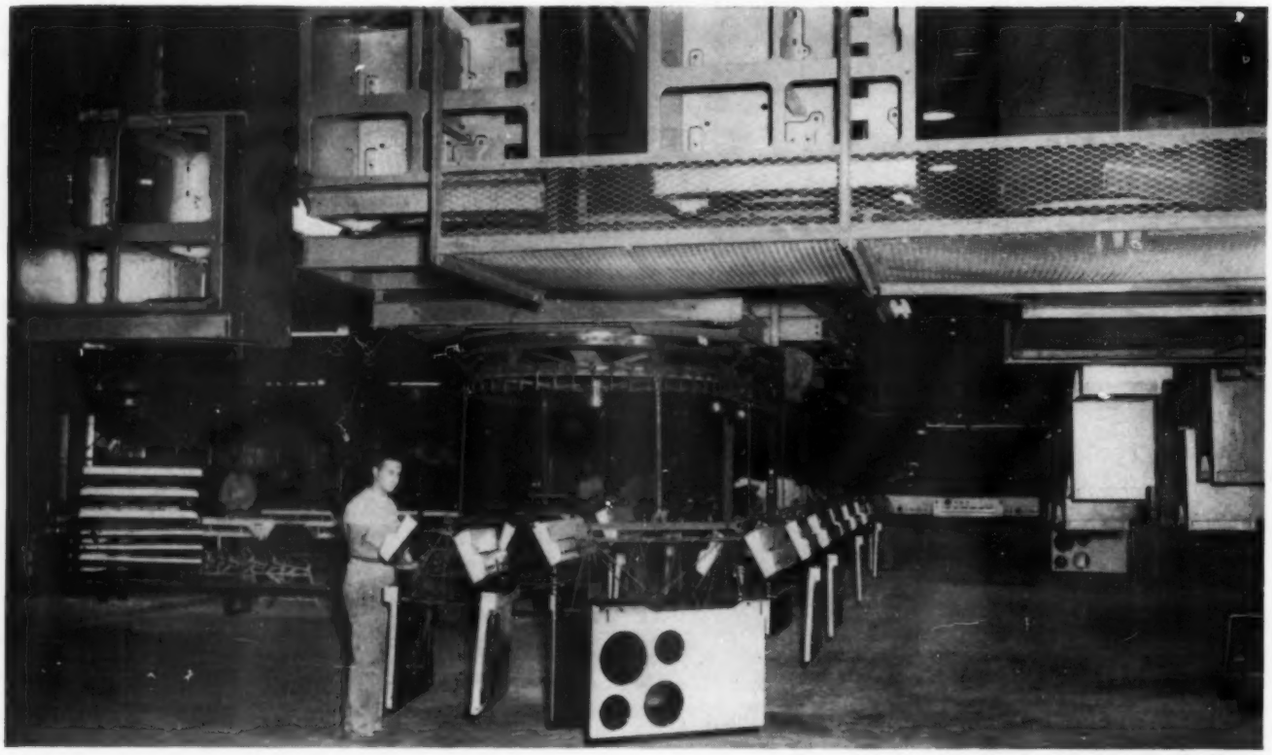
Spotwelding line for range drawers is supplied by overhead chain conveyor. Drawers are carried from the press operation through an automatic washer to the spotwelder where front plate, roller-guide assembly, and drawer stop are added. Air clamps hold parts on shuttle table for transfer to welding position



Multi-station presses produce trim rings for heating elements and drip pans that are assembled beneath the elements. Parts are made from stainless steel circular blanks in a press of 250-ton capacity, operating at 13 strokes per minute. Feed mechanism for blanks, lower right, has a 3-station indexing table. Blanks are lifted from each stack by the vacuum head of the transfer unit and are positioned for the first set of grippers on press

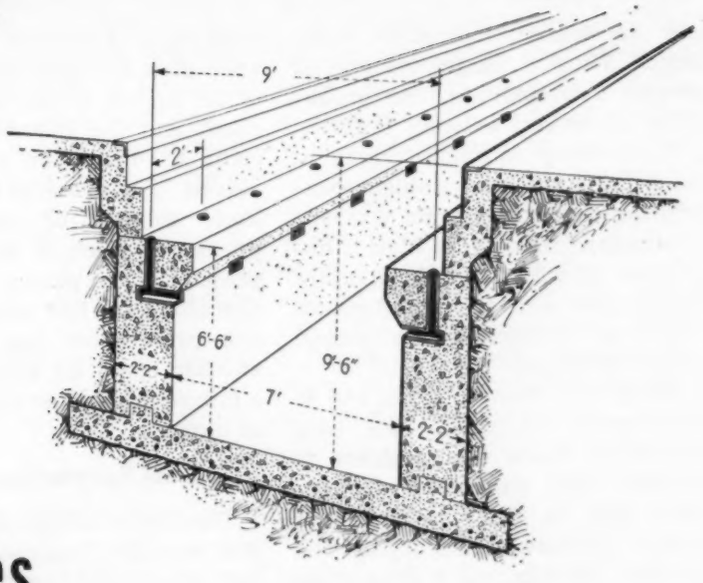


Transfer mechanism on trim-ring press has spring-loaded grippers to move parts from station-to-station during each return stroke of ram. At second station, a "grasshopper" chute catches scrap from inverted blanking die when knockout operates at end of ram return stroke. Chute swings out of way when ram descends. Oil spray at first station lubricates cupping die. All movements are in automatically timed sequence



Vitreous porcelain-enameling department is fully conveyorized for automatic processing. Storage conveyors above enameling equipment have capacity to hold parts for more than 800 ranges as a "cushion" to utilize three-shift operation of vitreous enameling furnaces. The department is arranged so different range parts pass through spray booths especially equipped to handle them efficiently

Press pits open with presses being installed in the line to provide production-line operation on a job. Any press of the 36 in the plant will fit this foundation



CONTINUOUS PRESS FOUNDATIONS

Simplify Layout Changes

Large presses can be moved in 24 hours to provide straight-line operation on job lots

BY J. T. SNEDDEN, Plant Engineer
Norris Stamping and Manufacturing Co.

SUITABLE production layout is a major consideration in the manufacturing plant producing articles on a relatively large scale. This becomes especially critical in the plant which is primarily concerned with the production of large volume sub-contract articles. In a concern engaged in this type of manufacturing, specialization in the process utilized is mandatory if any degree of efficiency is to be achieved, particularly when considering the plant layout.

The problem that confronted the Norris Stamping and Manufacturing Company was one of this type. This concern is engaged chiefly in production of articles by the processes of stamping and drawing, utilizing both mechanical and hydraulic presses—frequently with full compliments of auxiliary equipment, such as air cushions

Press pits closed with presses installed and operating and metal floor plates covering remaining sections of the pits

and secondary hydraulic draw rings. With a large variety of presses available and the probability of several entirely different articles being in manufacture at the same time, the problem confronting the organization was one of standardizing, to as high a degree as possible, the location of the presses and the maintenance of a true production-line method of manufacture.

All presses being utilized had to be capable of rapid and easy movement from one position to another. The possibility also existed that in order to have the proper presses adjacent to one another, establishing a production line on some article, any one of the 36 presses might be required in any position along the line. These presses range from 45 to 3,000 tons with bed dimensions of all conceivable configurations.

Another factor involved in the problem was that of the time necessary to break down and move one of the presses from one position to another. Normally, the movement of any large press becomes a major problem when all of the auxiliary equipment and facilities are taken into consideration. The cost of such an operation frequently prohibits the acceptance of a contract for production of an article if the unit profit is small and the quantity not sufficient to offset the expenses involved. The problem then reduced itself to one of mounting the presses in such a way that any press could be placed in any position along the line and a change of one press from one position to another could be accomplished in a minimum of time with minimum of expense.

Universal Foundation

The answer chosen for the problem was the design and construction of a flexible and continuous foundation, running throughout the area in the plant in which the presses would be utilized. This foundation also required service installations of air, steam, water, electricity, and sewers which had sufficient outlets to allow for extremely short connections from the outlets to the press, regardless of the position of installation along the foundation.

It was first necessary to make a composite scale layout of the floor plan for all mechanical and hydraulic presses in existence in the company, as well as anticipating future requirements in press sizes and capacities. From this composite layout, the various combinations of tie-down bolt patterns were determined and a supporting structure designed which would accommodate all of the various presses. This layout determined the width of the foundation which would be necessary to handle the anticipated layouts.

From a composite scale cross-sectional drawing of all the presses, including the die cushions and all auxiliary equipment, a cross-section was determined as to the depth of the required pit underneath the foundations. An additional factor involved in the depth of the pit was the problem of waste disposal and collection for recovery purposes of the expensive hydraulic oils that were used around the presses.

With the cross-section of the pit just determined, the only remaining matter was to determine the length which would handle the total number of presses which might ever be installed on the floor at any one time. The pit running continuously underneath all the presses made a convenient arrangement for work chutes and conveyors for recovery of parts

which were pushed through the die during the drawing operation.

An additional problem involved the floor-plate coverings which had to be installed over the pit. To accomplish this, it was determined that a certain integral floor would be adapted to each particular press and that the intervening space between the presses would accommodate standard rectangular metal floor plate covering which could be dropped into place and would support a working load of 1,000 pounds per square foot. This working load was satisfactory for all the work-storage and work-handling capacity anticipated.

1-Ft. Intervals

In order to insure that the presses could be installed at any position along the 560-ft. foundation, it was decided that positions within 1-ft. intervals would be sufficient to accommodate any required orientation of the presses. The rails, therefore, which were laid out in the concrete foundation to support the cross members across the pit were drilled with the standard bolt pattern at 1-ft. intervals. The bridge which crosses the pit was made with a standard sub-base and a series of adapters to adjust the sub-base to each particular press plan section.

At the time that this foundation was planned, it was also contemplated that an overhead crane would be necessary to handle stock in process over the same area. This crane was designed and installed to handle the weight of all but the largest of the presses that would be installed in the line. This crane facility enables the majority of the presses to be picked up from overhead and moved to any new location with the minimum amount of handling equipment. In order to supply the necessary service facilities, such as air, water, steam, and electricity, the through lines were laid in a conduit channel the full length of the foundation and it was determined that outlets at 4-ft. intervals should adequately take care of all service connections to the presses which would be installed. To enable the connecting links to be installed in the minimum amount of time, the conduits on the presses themselves were run to a standard length below the floor level and both the outlets on the main service supply and on the press were supplied with quick connecting links.

In the majority of cases of press installation, standard lengths of connecting linkages can be used so that the minimum number of sizes are required to handle the installation of a press at any position along the line. Shutoffs on all service facilities were arranged in such a manner so that any single press could be shut off from the circuits without interfering with the operation on adjacent presses that might be under production at the time a move was contemplated.

The initial cost of this installation was approximately 125% of the original cost of separate foundations for each of the pieces of equipment. The cost of moving a press, however, was cut to approximately 10% of the cost that would be required if separate foundations had been installed.

Whenever it is necessary to move a press, the following procedure is utilized:

1. Remove floor plates adjacent to press.
2. Shut off and disconnect service facilities.
3. Crib under the press for safety precautions.
4. Attach pick-up sling to crane.
5. Break down tie-down bolt connections between the bridge and the fixed supporting rails.
6. Lift and move the press to the new location.
7. Position and reconnect tie-down bolts.
8. Reconnect service facilities to the new outlets.
9. Re-install floor plates.

Whenever it is found necessary to move one of the presses which is too large for the crane to handle by itself, the standard supporting spider is provided to accommodate the installation of jacks to lift the press to floor level where it is placed on rollers, utilizing the crane as a stabilizing guide, and rolled to its new position. It has been found from experience from repeated moves involving the presses that any of the presses can be moved from one position to any other position along the line and re-installed, ready for use in approximately 24 hours.

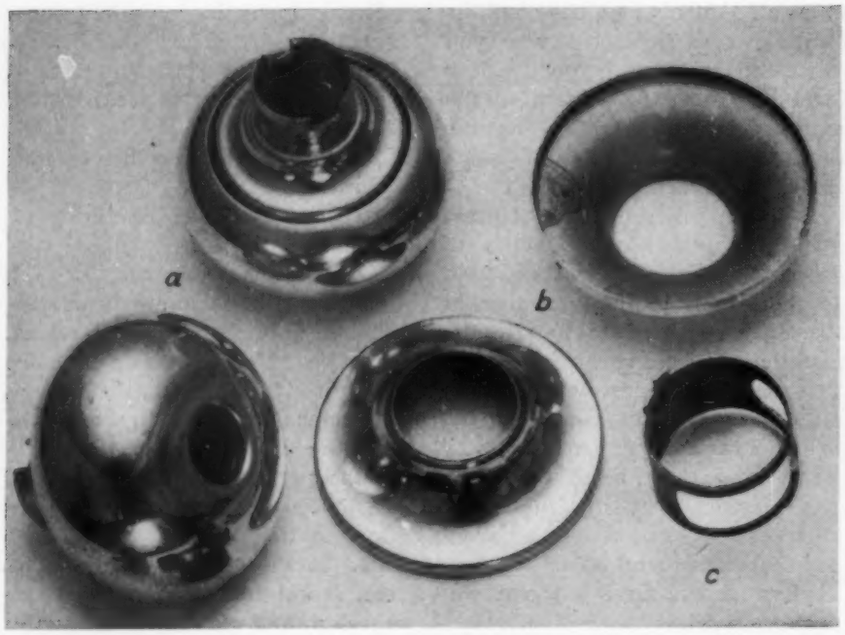
A pre-planned foundation for the installation of any group of large production equipment within a given area can be recommended as a suitable means for minimizing production losses and increasing the flexibility of plant operation in any plant which is not in continuous production on some single article. This is especially true when the type of operation which is being performed is relatively standard, as is Norris's specialization in press operations.

"Well, shrimp even if you can't do a lick of work in 'em you're going to be safe not doing it anyhow"

Gluecksi

PRECISION

Knobs for tubular locks



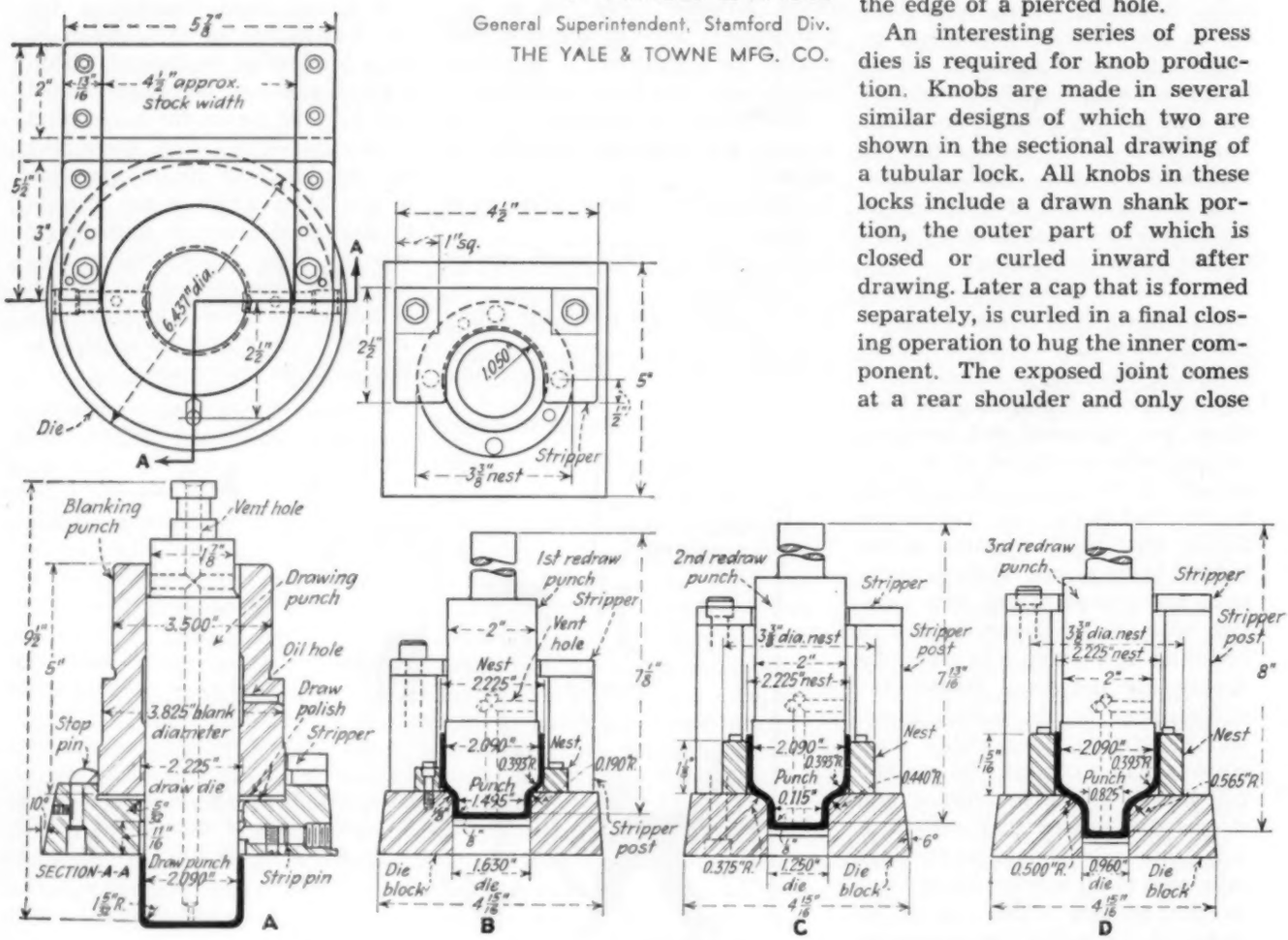
Stamped parts employed in making tubular locks include assembled knobs *a*, finished roses *b*, housing ring *c*.

BY HAROLD E. NAGLE
General Superintendent, Stamford Div.
THE YALE & TOWNE MFG. CO.

TUBULAR LOCKS, for which dies to mass-produce die-castings were described in a previous issue, include a number of interesting parts produced by blanking, drawing, piercing, and other press operations. A group of these parts is illustrated.

Some are simple drawn cups or flat parts produced by blanking and piercing. Several parts include pins produced by screw machines and assembled in pierced holes by riveting or staking. In some cases die-cast parts are assembled to stampings by heading integrally cast rivets or by spinning a lip over the edge of a pierced hole.

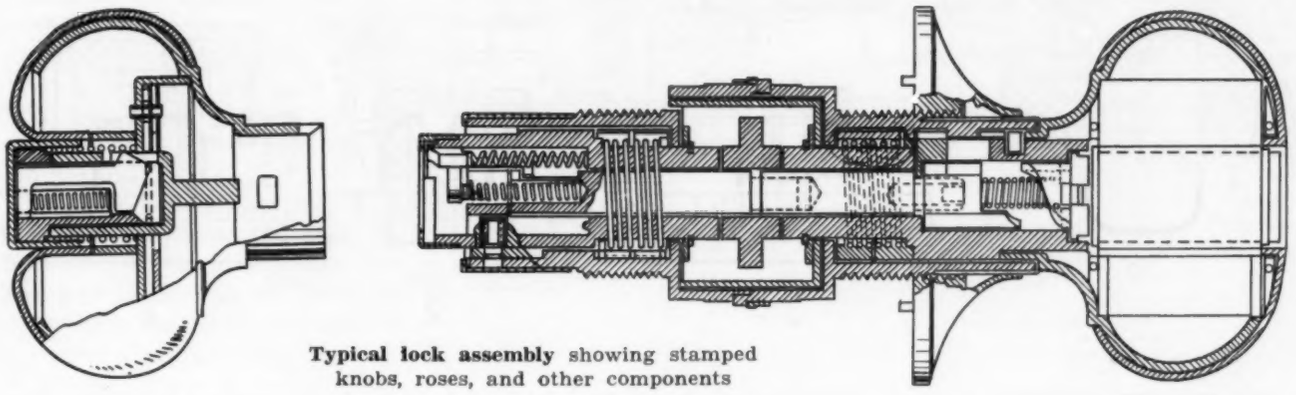
An interesting series of press dies is required for knob production. Knobs are made in several similar designs of which two are shown in the sectional drawing of a tubular lock. All knobs in these locks include a drawn shank portion, the outer part of which is closed or curled inward after drawing. Later a cap that is formed separately, is curled in a final closing operation to hug the inner component. The exposed joint comes at a rear shoulder and only close



TUBULAR KNOB SHANKS are produced in this series of eight dies

DIES DRAW BRASS LOCK PARTS

are drawn and die assembled so the joint is practically concealed when knobs are mounted



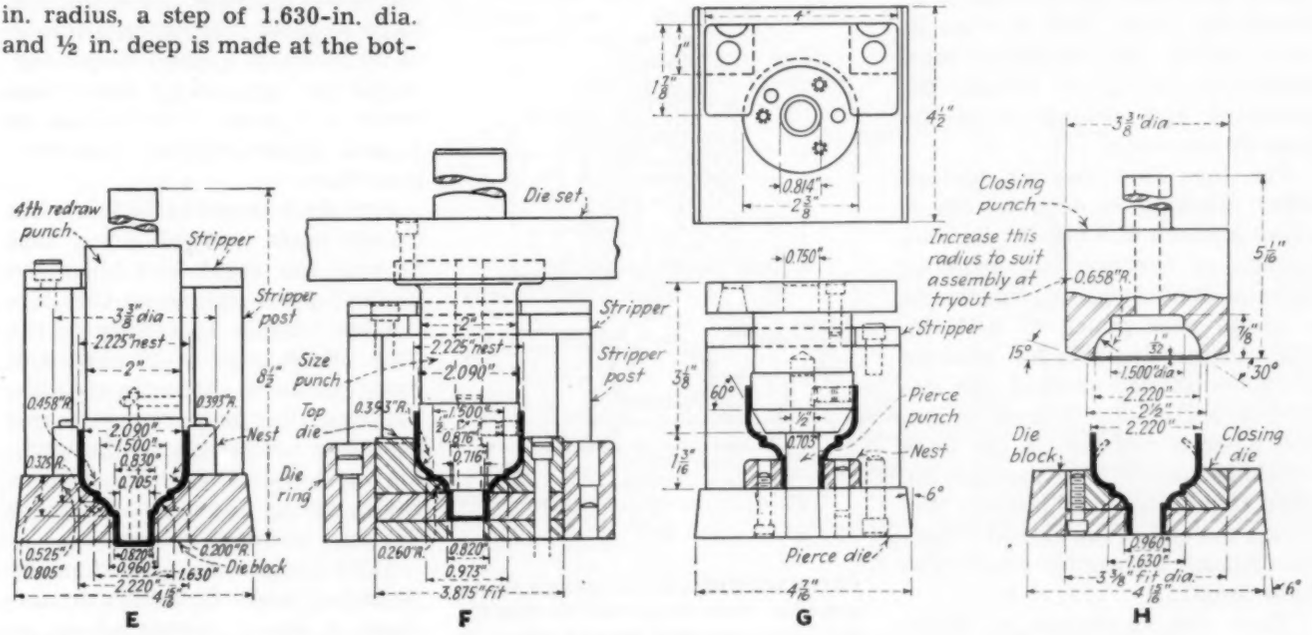
Typical lock assembly showing stamped knobs, roses, and other components

inspection reveals its presence, thanks largely to good design and good tooling. Stock used is quarter-hard brass, 0.065 in. thick.

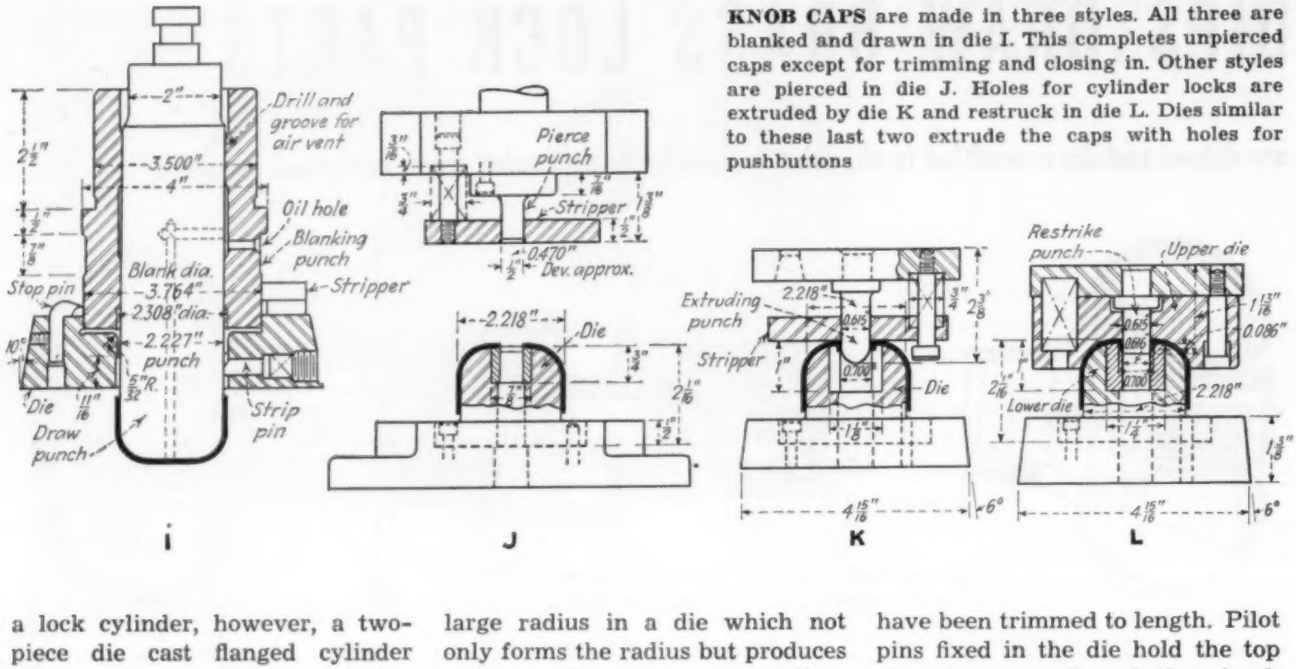
Shanks are produced in a series of eight separate dies as quantities are not sufficient to warrant a progressive die or a transfer setup. Blanking and first draw take place in die *A* and yield a cup of 2.090-in. I.D. and about 1½ in. deep. The draw radius is 5/32 in. Two bevel-end, spring-actuated cross pins strip the cup from the punch as it is withdrawn.

In second draw *B*, around a ⅛-in. radius, a step of 1.630-in. dia. and ½ in. deep is made at the bottom of the cup. This step is reduced to 1.250-in. O.D. and about 11/16-in. depth in third draw *C* around a ⅜-in. radius, and to 0.960-in. O.D. and about 15/16-in. depth in fourth draw *D*. In fifth die *E*, the shank is reduced to its final outer diameter of 0.820 in. and to 0.705-in. I. D. In addition, the punch forces metal to flow into sharp corners to produce two shoulders above the shank.

In sixth die *F*, a punch of 0.716-in. dia. increases the I.D. of the shank slightly but leaves the O.D. unchanged. This die also sharpens the inner corners opposite the external shoulders. Piercing out the bottom is done in die *G*, using a punch of 0.703-in. dia. The final operation, *H*, in this set of dies is to curl or close in the upper portion or skirt, using a punch hollowed on a 0.658-in. radius, after the skirt has been trimmed to a height of 0.682 in. above the lower die. This gives the skirt its knob-like shape. For knobs that receive



which blank, draw, redraw, size, and pierce the piece



KNOB CAPS are made in three styles. All three are blanked and drawn in die I. This completes unpierced caps except for trimming and closing in. Other styles are pierced in die J. Holes for cylinder locks are extruded by die K and restruck in die L. Dies similar to these last two extrude the caps with holes for pushbuttons

a lock cylinder, however, a two-piece die cast flanged cylinder holder is inserted before closing in. This casting seats in and is centered by the 1½-in. I.D. and has a pair of projecting gears that fit slots previously cut in the skirt. These ears and slots keep the cylinder from turning in the assembly.

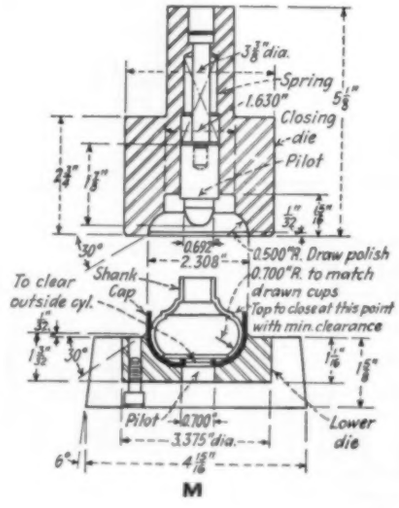
Knob tops or caps are produced in three styles: one for a plain unpierced top, one having a hole pierced and extruded inwardly and with relatively sharp corners for use with lock cylinders and one having an inwardly extruded hole for a push-button assembly. The initial operation on all tops is to blank and draw. This is done in die *I* which, for unpierced tops, completes the piece except for trimming and closing in at the time of assembly.

For tops that require pierced holes, piercing is done in die *J*, using a punch of 0.470-in. dia. Extrusion of the hole for cylinder locks is done in die *K*, which has a round nose punch of 0.615-in. dia. As this die does not produce a square corner or hold the extruded portion to desired length, the piece is restruck in die *L* in which the punch is in an upper die that strikes the top surface and forces the end of the extruded portion against a shoulder which controls length.

Tops for push-button knobs have the hole extruded with a large radius in a die which not only forms the radius but produces a deeper (longer) extrusion than die *K*. The control of length of this extrusion and final sizing result from restriking in a die similar to *L*.

Closing Knob Tops

Closing in of tops over shanks is done in die *M*, which is altered only slightly for different styles of tops by providing different pilot pins that fit the two different types of extruded holes In both cases, as well as for tops having no hole, the die recess is made to fit the contour of the tops, all of which have been trimmed to length. Pilot pins fixed in the die hold the top stamping central and the shank stamping is centered automatically by a round-nose pin that retracts against a spring in the upper die after the top end of the shank seats against a shoulder on the retracting pin. Further motion of the upper die causes the end of the inverted top to strike a polished 0.500-in. radius of the upper die, which does the closing in as the upper die completes its stroke.



CLOSING DIE assembles knob skirts and tops. Pilot of appropriate size fits in lower die for pierced caps, is omitted for plan caps

This closing operation brings the edge of the top quite close to the shoulder formed on the shank, hence a minimum clearance is left. Fit of the top over the shank has to be so close that, when a torque of 50 in.-lb. is applied to the cap, it will not turn on the shank. All knobs are given a torque test as a part of the regular inspection procedure.

Each lock assembly includes two drawn parts, termed *roses*, that fit over the shank and hides the plate-and-nut assemblies that fasten the tubular lock body to the door. Each rose is blanked and drawn in die *N*. Immediately after blanking, the piece comes to rest against a central pin in the lower die and is drawn against a formed radius of the upper die, leaving a flat skirt or flange below.

More precise sizing is done by restriking in die *O* which also produces a square corner where, at the 0.998-in. dia., a small radius

was left in the prior operation. A 5/16-in. pin that retracts against a spring in the upper die seats the piece firmly against the lower die before the upper one strikes home.

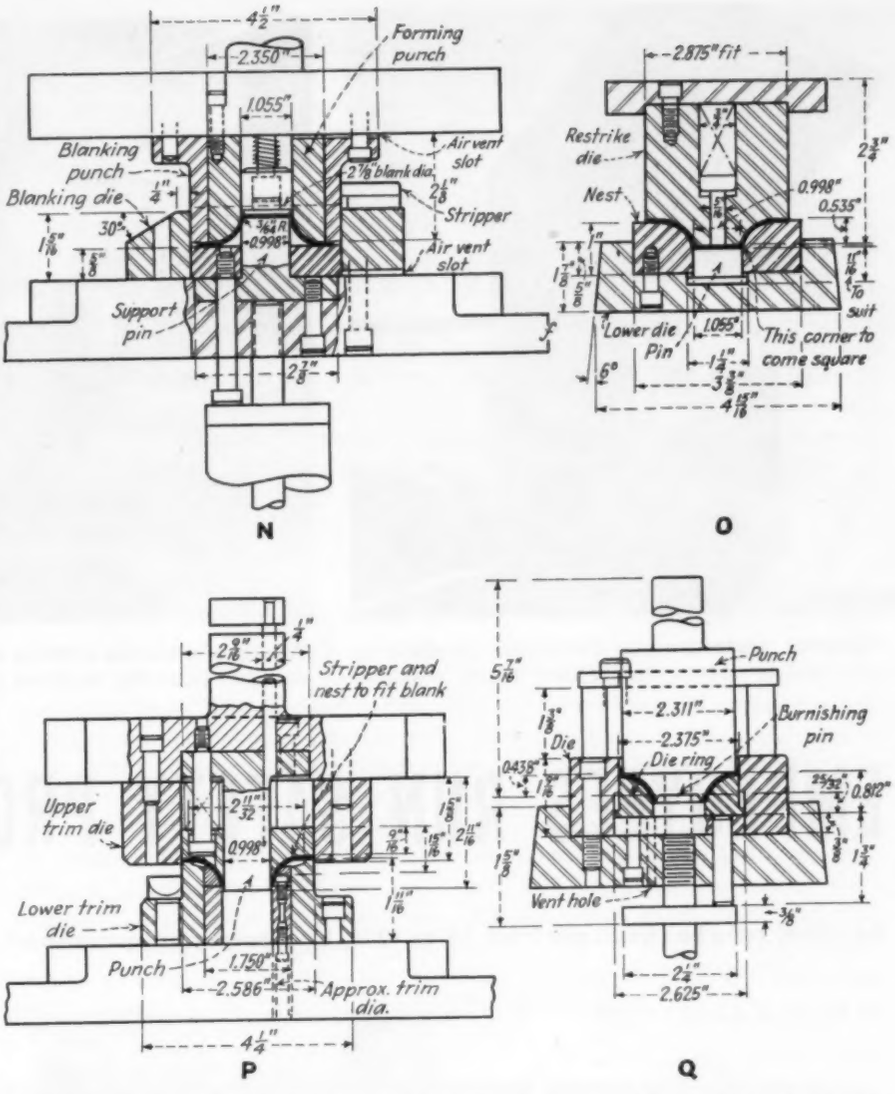
In die *P*, the rose hole is pierced by a punch of 0.998-in. dia. and the outer diameter of the rose is trimmed to 2.586 in. This die insures that the hole and outer diameter are concentric which helps, in turn, to insure having a skirt of uniform height drawn on the finished piece in the next operation.

This skirt is produced in die *Q* which also burnishes the hole. A punch of 2.311-in. dia. forces the piece into a die hole of 2.375-in. dia. to form the skirt and over a pin having a radius at the top and a 0.010-in. radius at a shoulder. This pin does the burnishing after which the punch is withdrawn and the die ring is elevated to eject the piece. This completes work on the rose except for putting three small dimples in the skirt to hold it in place when the rose is snapped over the edge of the plate that fastens the lock body to the door.

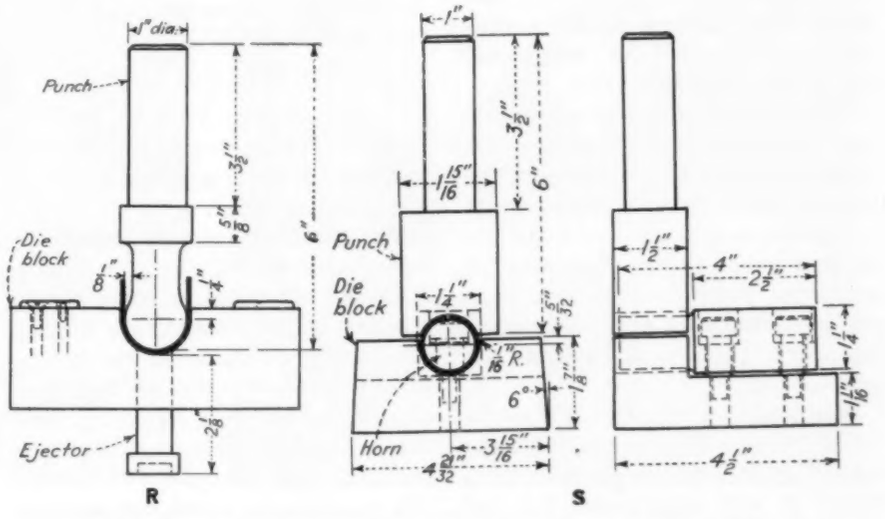
Forming a Ring

Among other stampings required in the lock assembly is a part called a housing ring which is merely blanked and pierced initially from brass strip. To form the piece into a ring, half of the blanked piece is formed to a semicircle in die *R*, the ends remaining straight so that the piece has a U-shaped form produced by a punch with cylindrical end and mating die.

This initial forming prepares the piece for insertion between the horn of die *S* and the die itself. The punch has a semicylindrical recess in its lower end and, when the punch is lowered, the ends of the U-shape piece are curled inward around the horn, to complete the forming into a ring in which the ends of the piece butt at a joint parallel to the axis of the ring. At assembly, this ring is inserted inside the die cast tubular housings and, when turned about 90°, enters slots in two halves of the bolt housing, fastening these to the tubular housing in a simple but effective way.

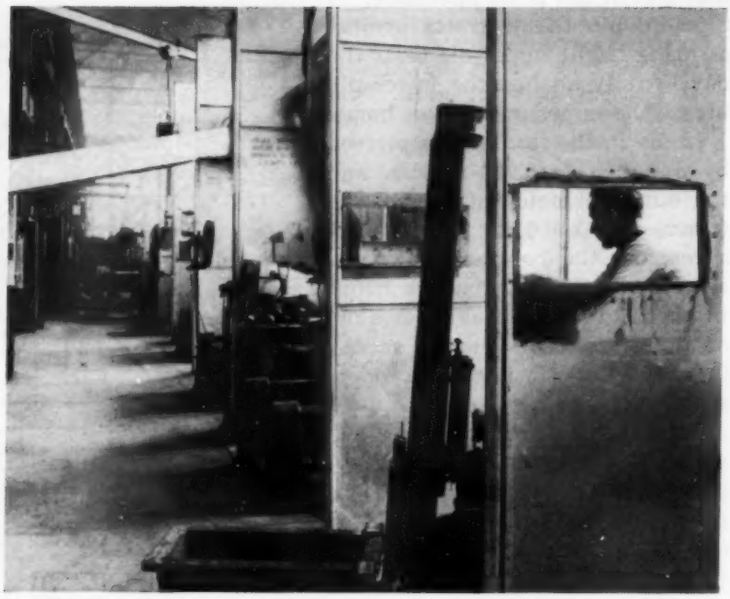


ROSES, which fit over shank and hide method of attaching lock to door are blanked and drawn in die N, restruck in die O, and pierced in die P. Rose skirt is drawn and the central hole burnished in die Q. Three small dimples are subsequently put in the skirt so the rose will snap into place on the plate attaching lock to door



HOUSING RING is started by U-bend in die R, then completed by closing over horn by punch with semicylindrical recess

Operator protection on die-casting machine is provided by guard which moves with machine



Windows in shields between die-casting machines permit truck operator to see traffic in cross aisle, reducing danger of collision

EMPLOYEES RUN SAFETY PROGRAM

Accident rate has been cut from 59 to 12% by a safety program sparked by an employee committee

BY VICTOR GRUENDLER

Safety Director, Madison-Kipp Corp.

RECOGNIZING that the real solution to satisfactory safety operations in any plant begins and ends with the interest and enthusiasm of the workers themselves, Madison-Kipp Corporation decided to organize a safety program in which the employees would play a major part.

While the activities of our safety committee are under the direction of management to some extent, the full responsibility for the program to reduce accidents has been for several years in the hands of an employee committee of five, each one representing a particular phase of work performed within the plant.

We recognize that this is a somewhat unorthodox approach to the handling of a safety program in a plant of 400 employees, but we have found that it works with us. Our accident frequency has steadily declined from 59% in 1943 to 12% in 1947. Five months were worked in 1947 without a single lost-time accident.

Backing employees in the safety program are the author (left); Freda Bollman, plant nurse; and R. F. Tierney, plant manager

We consider this an especially remarkable record when the nature of our business is considered. Madison-Kipp is among the largest die-casting concerns in the country in the production of zinc and aluminum castings, handling between 6000 and 7000 tons of molten metal a year. Despite this potential exposure to burns, we had but 140 cases of burns in our first-aid department in the whole year of 1947. 136 of these were minor burns and blisters, requiring only the initial treatment by the first-aid department, and four requiring further treatment. In a recent survey made by the American Die Casting Institute, Madison-Kipp showed a workmen's compensation cost of but 78 cents for each 1000 man-hours worked, among the lowest reported for plants of this size.

Our organized safety effort on its present basis goes back to 1944. It was decided on after the previous year had produced a record of frequency of accidents that not only alarmed our workers but threw our compensation insurance cost out of line. Mr. T. E. Coleman, our president, decided something new had to be tried. With the cooperation of management, the workers themselves, and Employers Mutuals of Wausau (our insurance carrier), we devised the present employee committee system.

Five members were chosen—all workers—from every plant area.

These included men from the toolroom, the casting department, maintenance, machine, and assembly departments. In order that the experience of working on the committee might be spread among as many workers as possible, a system was set up to rotate membership on the committee. This provided that each member would serve for 15 months and that one member would be changed every three months. The retiring member nominates three men from his department and the committee then chooses the new member from these three names.

In addition to the members of the committee, and former members, who rarely lose the enthusiasm for safety that experience with the committee produces, additional interest is created among the workers by the choice of a guest member of the committee each month. This selection is made by one member of the committee each month.

It is the duty of this guest member to make an inspection of every department and report to the safety committee any situations which appear to him to present safety hazards. This infusion of new blood and new interests often calls matters to our attention that may have been overlooked by the regular member in his own department.

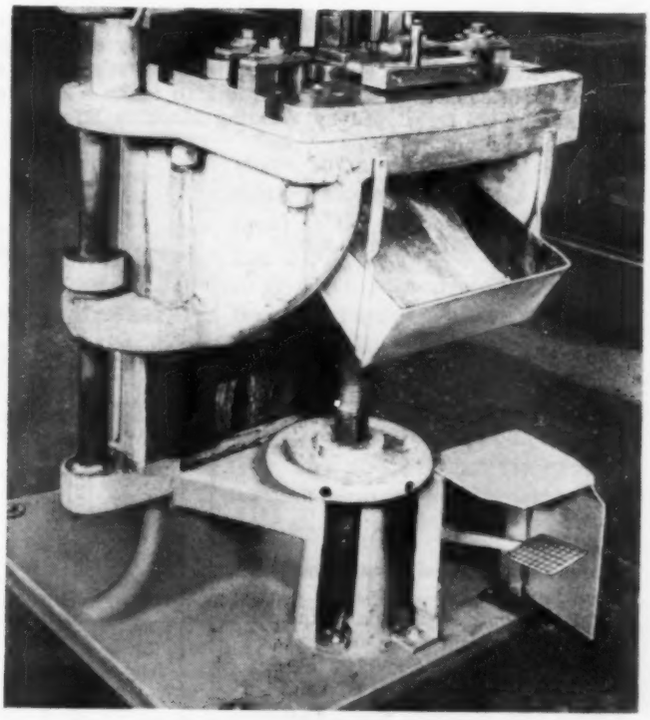
Regular inspections are also made by myself, as head of the safety committee, and by our Employers Mutuals' engineer who makes his reports to me for presentation to the committee. Our insurance company is also responsible for the installation of our company nurse, Mrs. Freda Bollman, R. N., and the work with her of Miss Helen Reischl of their nursing division has been a major factor in the reduction of lost time from minor burns, infections, and other injuries.

Committee meetings are held the second Tuesday of every month at one o'clock and usually last about an hour. These consist primarily of new recommendations to improve hazardous conditions which have been discovered, reports on what has been done on previous recommendations, and general discussions of ways and means of improving our record.

Plant Manager R. F. Tierney receives a copy of the minutes of each meeting and, with the complete backing of top management, sees to it that necessary changes recommended are taken care of as rapidly as possible. Every possible equipment is supplied to workers for their protection. Gloves of cloth, asbestos, or leather are furnished, depending on the nature of a man's job. Safety goggles are supplied, and the 25 to 30 women in the plant are provided with caps to protect their hair. The company also pays a portion of the cost of safety shoes. Mrs. Bollman and myself are encouraged to attend local and regional safety meetings at company expense in order to keep abreast of the latest developments in safety techniques.

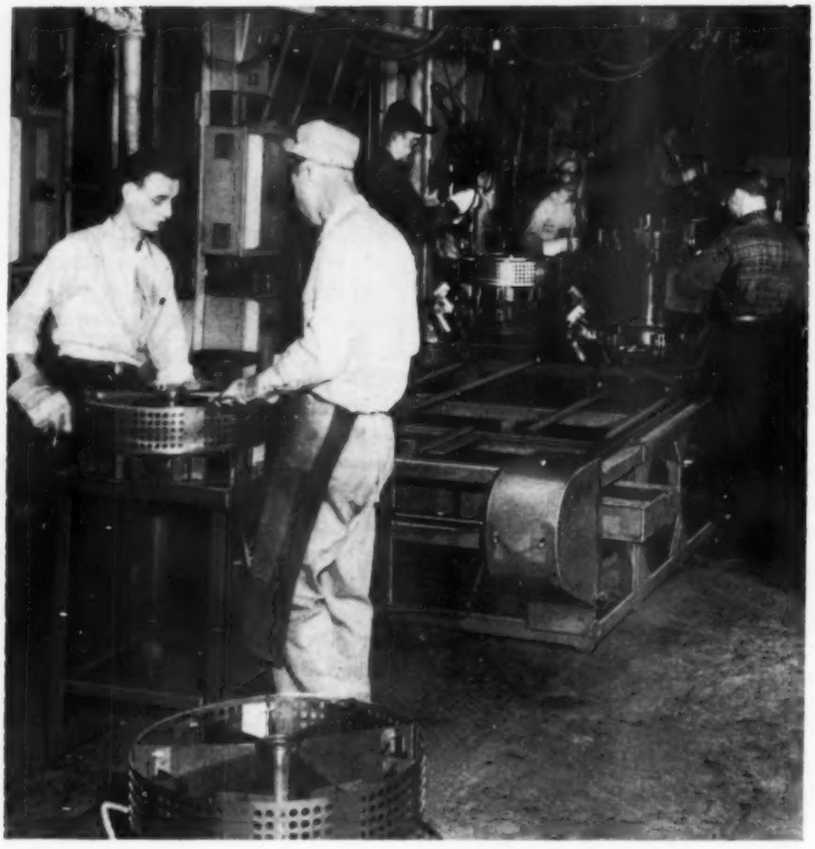
How well safety pays off financially as well as in the health and welfare of our employees is indicated by the steady improvement in our workman's compensation insurance costs in the years since the committee started to operate in 1944. In 1944 these costs were 1.7% higher than the base rate for our classification. In 1945 our record had improved so much that our rate was 6.2% less than the base rate, in 1946 it was 25.3% less, and in 1947 35.3% less than the base rate.

Holder devised to fit parking meter casting so that operator's right hand is kept away from punch press in trimming operation. Sweep guard clears left hand



Guard is placed over pedal on all punch presses so cycle cannot be started accidentally by a tool or other object falling on the pedal

CARROUSEL ASSEMBLES & WELDS

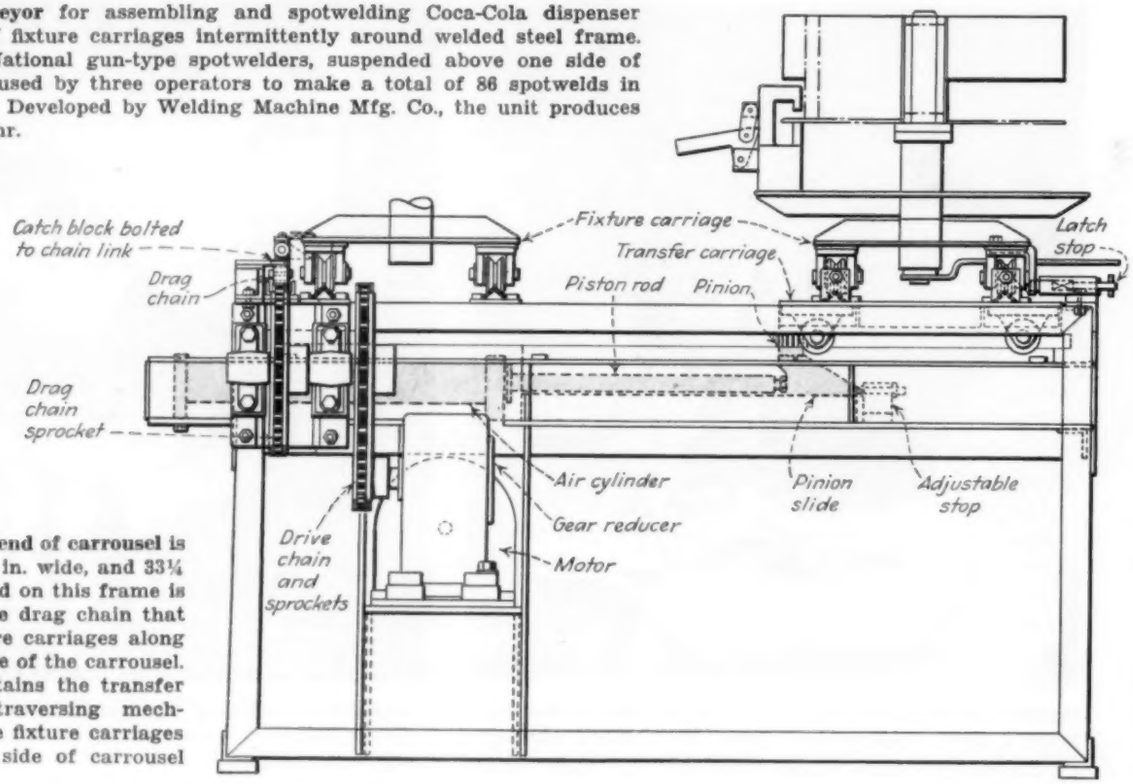


Carrousel conveyor for assembling and spotwelding Coca-Cola dispenser drums moves 7 fixture carriages intermittently around welded steel frame. Four 75-kva. National gun-type spotwelders, suspended above one side of the track, are used by three operators to make a total of 86 spotwelds in each assembly. Developed by Welding Machine Mfg. Co., the unit produces 40 drums per hr.

Power and gravity conveying,

A UNIQUE CARROUSEL has been set up at the F. L. Jacobs Co., Indianapolis Division, for the production of dispenser drums for Coca-Cola bottle-vending machines. Rectangular in shape and of inclined construction, the unit is laid out for assembly on one side and welding on the other. Power moves fixtures up the incline for assembly operations and gravity takes fixtures downgrade through the welding stations. Automatic rapid-traverse carriages transfer fixtures between the two sides in fixed relation with the line operations. With this setup 6 men assemble 20-in. O.D. drums from 16-gage cold-rolled stampings at the rate of 40 per hr.

Seven assembly fixtures are moved from station to station around the carrousel frame on carriages, each of which is equipped with four grooved casters. These casters roll on inverted 1¼x1¼x⅛-in. angles bolted on 12-in. centers along each side of



Frame at upper end of carrousel is 60 in. long, 24¼ in. wide, and 33¼ in. high. Mounted on this frame is the drive for the drag chain that moves the fixture carriages along the assembly side of the carrousel. Frame also contains the transfer carriage and traversing mechanism that move fixture carriages to the welding side of carrousel

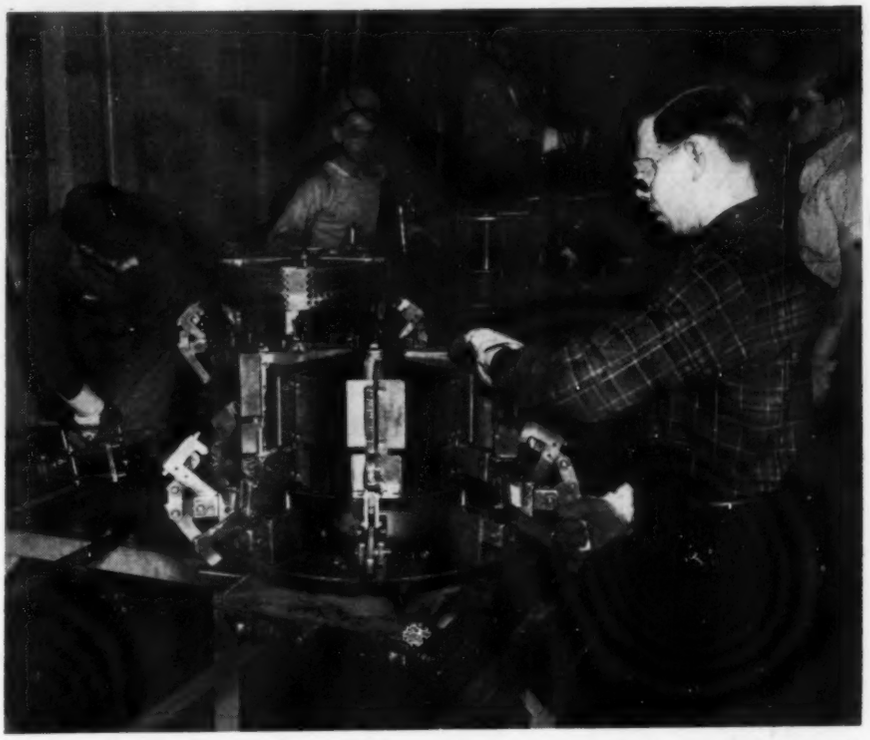
LARGE DISPENSER DRUMS

plus an automatic transfer mechanism, are included in this one production setup

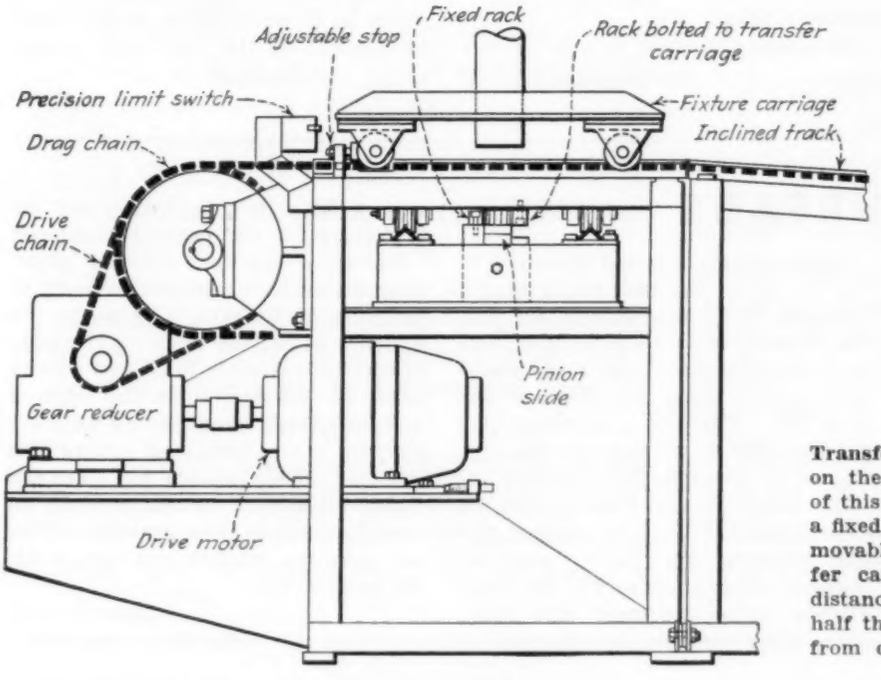
the carrousel. At each end is a transfer carriage that moves the fixture carriages across the frame to the tracks on the other side.

The welded steel frame of the carrousel is 30 ft. long and 5 ft. wide, with one end 10 in. higher than the other. Thus, tracks joining the two ends are inclined sufficiently to cause fixture carriages to roll by gravity down one set of tracks along which four National gun-type spotwelders are located. Latch-type stops at each station hold the carriages in position while the welding operations are performed.

At the lower end of this incline, fixture carriages roll onto tracks bolted to the top of a transfer carriage. The assembled drum is removed to an inspection stand, and an air control valve is operated to move the transfer carriage to the other side of the frame. At this position, a hardened steel dog bolted to a drag chain catches against one side of the fixture carriage to move it from station to station along the rails to the upper level of the carrousel frame. During this travel parts are positioned in the fixture and clamped. When the carriage reaches the upper level the drum is ready for welding.



Welding fixtures have quick-acting toggle clamps that permit rapid assembly and accurate location of dispenser-drum parts. The 15x21½-in. fixture carriage is mounted on four 2½-in. grooved brass casters, and has a vertical spindle about which the fixture can be rotated to suit the convenience of the welders



At this high end of the frame, the fixture carriage rolls onto the rails of a second transfer carriage, moving against positive stops and

Transfer carriage is moved by a pinion slide on the end of an air-cylinder piston. On top of this slide is a small pinion working between a fixed rack bolted to the support frame and a movable rack bolted to the bottom of the transfer carriage. This arrangement doubles the distance traveled by the piston and cuts in half the time required for moving the carriage from one side of the carrousel to the other

Transfer mechanism in frame at lower end of carrousel illustrates arrangement of the slide pinion and the two operating racks. Fixture carriage moves against positive stops on transfer carriage. When drum has been unloaded, operator opens air valve to move transfer carriage to other side of carrousel. There, dog on drag chain moves fixture carriage from transfer carriage along rails to assembly stations

Gun welder has jaws especially designed for the work to be done; each of the National 75-kva. units is similarly equipped. The first gun spotwelds 16 joints; the same operator then moves the fixture to the second gun, where he welds four joints. 36 joints are welded at the third station and 30 at the fourth. When his welds are completed, operator releases latch stop on side of frame and fixture rolls by gravity down inclined rails

operating a small precision limit switch. This actuates a solenoid valve controlling the air cylinder that moves the transfer carriage and brings the fixture carriage back to the rails along the welding side of the carrousel frame.

Return of the two transfer units is automatic and each traverse cycle of the upper transfer carriage automatically controls the drive for the drag chain on the assembly side of the carrousel. This chain moves approximately 9 ft. during each cycle, thus positioning a fixture carriage at each of the two assembly stations along the carrousel frame.

The welded steel frame at the upper end of the carrousel is 60 in. long, 24¼ in. wide, and 33¼ in. high. At the other end of the carrousel, the cross frame is 60 in. long, 24¼ in. wide and 23¼ in. high. Three welded-steel frames separate these end members, the longitudinal track support being made in three units to permit easy movement of the carrousel frame when dismantled.

NO 27 THREADS

To me, right now, something seems to be haywire with one of our standard threads. I had occasion, not so very long ago, to make a ⅛-in. pipe-thread gage. Lo and behold, when I observed that the numerous modern quick-change-gear lathes did not provide for the cutting of 27 tpi., I became almost dizzy with futility.

I wandered around in a fit of disgust and finally landed in a dark corner where antiques were reposing peacefully until being dragged out by the scrap man. Among that mass of has-beens was an old-timer with a grease-covered board fastened to the tail end. On this board was a selection of gears complete for cutting threads from soup to nuts. The far-seeing designer, who rests peacefully under some velvet-green sod in a New England graveyard, had the foresight to arrange for the cutting of 27 threads—the standard for ⅛-in. pipe. Would I be considered too radical, if I were to suggest that the standard for ⅛-in. pipe be changed either to 26 or 28? Or could modern lathe designers rub Aladdin's lamp and smoke themselves into a little practical thinking by providing for the present standard?

Let me dwell upon another 'gripe' (remember that a gripe is a mark of progress at times): Why go to the expense of cutting teeth on the edge of files? It certainly must cost money to do it. Whoever uses the edge of a file anyhow? And then, why don't they leave one surface of square files smooth? Every square file I get my hands on I have to trot over to an emery wheel to free one edge. Why not save the trouble and save a little money, too?

Jack Everett
San Francisco, Calif.

"Give us the tools . . ."

For High Wages, Full Employment . . . Business Must Have Better Tools *and More Money to Pay for Them*

So far we have escaped the post-war depression predicted by leading government economists. How can we continue to frustrate gloomy prophets who see only depression ahead?

At the end of World War II the federal Director of Reconversion saw depression immediately ahead. He said we would have 6,000,000 unemployed four months after VJ-Day and 8,000,000 a few months later.

But we did not have depression. We did not because:

First, the American business man, sensing the obligations of a vastly more important post-war America, went ahead to build his plant and equipment to meet expanding domestic and world markets—markets bigger actually and potentially, in terms of world-wide trade and profits than any previously envisaged.

Second, the American businessman was able to get the money to go ahead. Since 1945 he has spent $50 billion building new plants and buying new equipment.

There may be other reasons why we missed a depression in 1946. But—make no mistake about it—what has powered our present prosperity is the $50 billion spent by businessmen since VJ-Day to improve their plants.

It provided jobs directly for 5 million people. It paid for more than half of our record-breaking steel output. It put in place the foundations of great new industries such as television. It strengthened the foundations of the chemical, machinery, plastics, steel and oil industries. It has expanded and improved our power systems throughout the country.

This spending has made the difference between prosperity and slump, between industrial strength and serious deterioration.

In fact, we know now that what business spends for new plants and new tools always makes the difference between prosperity and slump, the difference between national strength and weakness.

The accompanying chart tells the story. When we have spent heavily for new plants and equipment, we have had prosperity and strength. When we have not, we have been in trouble.

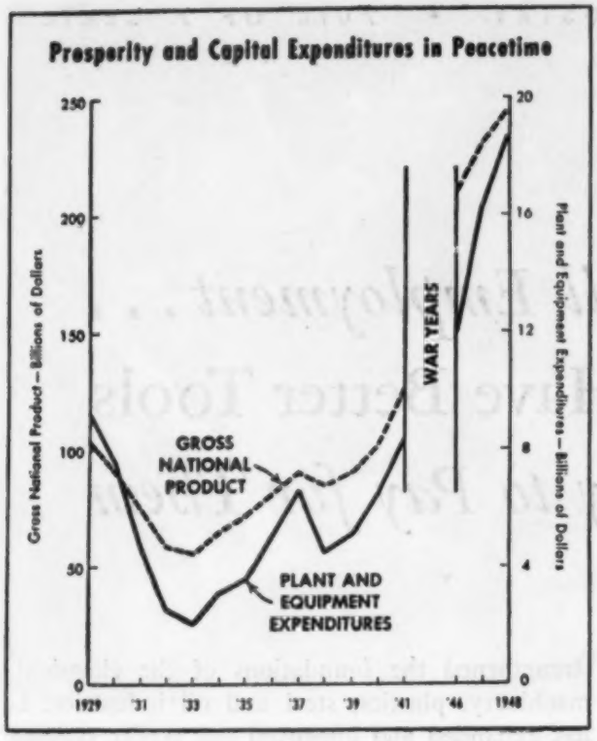
We would have been in trouble since VJ-Day except that business used its war reserves, plus two-thirds of its profits, plus borrowed money to improve and expand its facilities. This year industry is spending $19 billion this way.

Has this great post-war expansion actually made our economy a "mature economy"? Have we come now to the saturation point the New Dealers mistakenly said we had reached in the '30's?

The answer is no!

Proof of that answer is being developed through a McGraw-Hill national survey of "Business' Needs for New Plants and Equip-

continued on next page



ment" details of which will be given in this editorial series in coming months.

We have a bigger nation, more people, to serve right here at home. Further we must meet human needs which the war created around the world. Also, we must sustain a world position such as this country never assumed before.

Here are immediate things crying to be done.

1. Business still needs billions to expand production because our country and our needs are growing rapidly. Example: To meet the demand for power, electric utility companies must nearly double their present generating capacity in 10 years. That will cost more than $7.5 billion. To fill increasing needs for oil and gasoline, oil companies must spend at least as much.

2. Business still needs billions to get its plants up to date and overcome wear and tear. Examples: Over half a million of our freight cars, a third of the total, are more than a quarter of a century old. About two-thirds of the looms in the textile industry are more than 20 years old. Half of our coke ovens, basic equipment for iron and steel production, are more than 20 years old, and only half as efficient as modern ovens.

3. Business still needs many billions to do new things in dramatic new ways. Example: Machinery that will cut out 80% of the dirty, dangerous work of mining soft coal has been perfected. A new automobile engine plant will reduce the work that goes into engine-building by three-quarters.

Hundreds of similar things that our scientists and engineers have developed could be cited. They can be found in every industry. They hold immeasurable promise of adding to the abundance of American living. In fact, there is hardly a step along the whole route of industry—from roughing out raw materials to delivering finished goods—where there are not new and better ways of doing things standing ready for general use.

But the crucial question now is: Where is the money coming from to put to work these new and better ways of doing things?

Business has used its own resources so far... profits and reserves. The stock market, where industry traditionally has raised money from people willing to risk their savings, has been limping along, giving business no chance to get enough money on satisfactory terms. *Business now must look primarily to its own earnings for the money to carry out the improvements which are necessary if America is to keep itself strong and efficient.* The next editorial in this series will deal with this new and crucially-important role of profits.

But business can not count on profits alone to do the job. Profits are too uncertain.

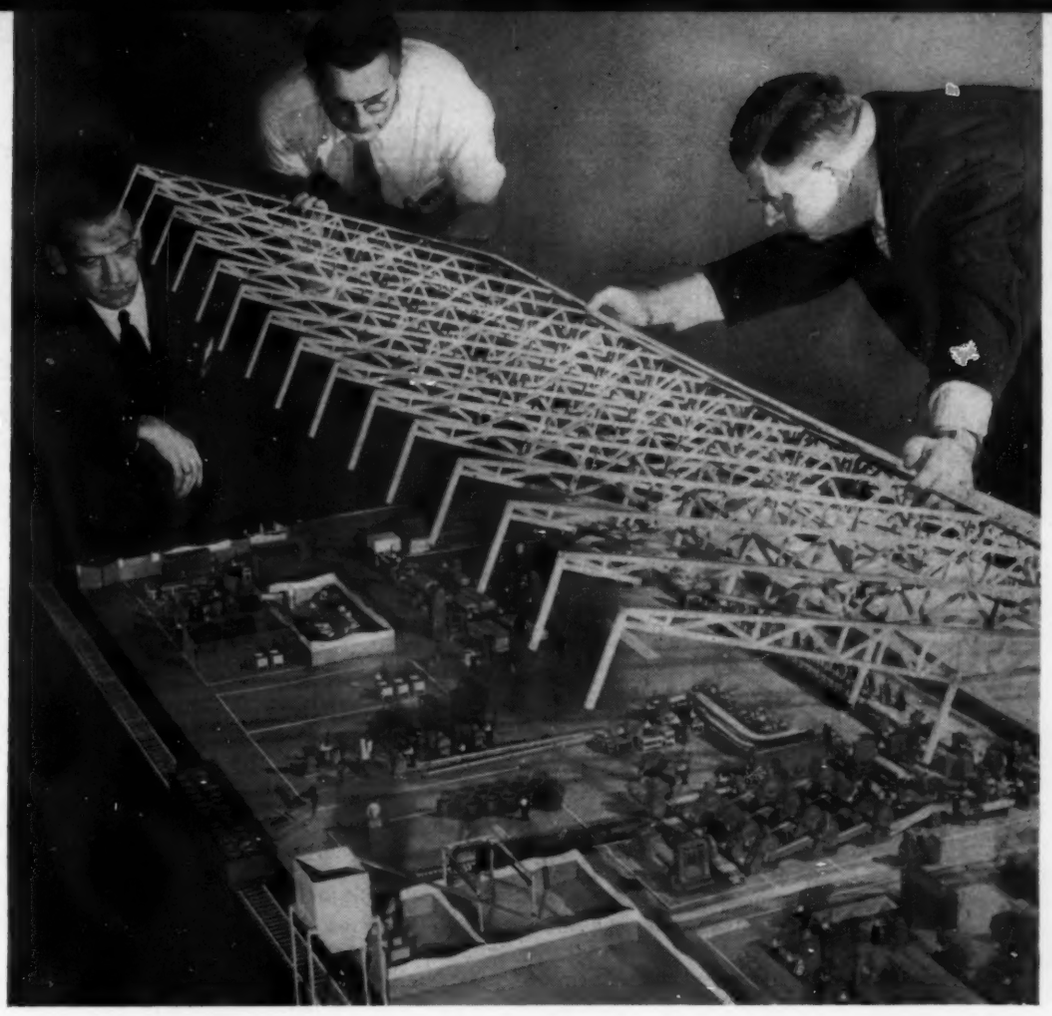
From now on finding the money... to put new ideas and new equipment to work... to go ahead with the expansion and improvement that will thwart depression and build industrial strength ... *calls for the support of all Americans everywhere.*

This comes right down to *you... for at stake is your chance for steady work, for better pay, for new things like television, and for more of the every-day things, like coal and clothing, of better quality and at less cost.*

By helping business get new and better tools, you will help yourself—and you will help build a more sound, more prosperous, better America.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.



Efficient handling needs good layout. The right material must be moved to the right work area at the right time

HOW Materials Handling AFFECTS PLANT LAYOUT

BY MILES J. ROWAN, ASSOCIATE EDITOR

MATERIALS HANDLING is the greatest single item of indirect factory expense. From 22 to 35% of the over-all cost of production stems from this source in the average plant.

From another point of view, the wages of labor engaged in handling operations have risen 200% during the past 10 years. This means that the modern equipment required to slash handling costs can now be written off in about one-third the previous time.

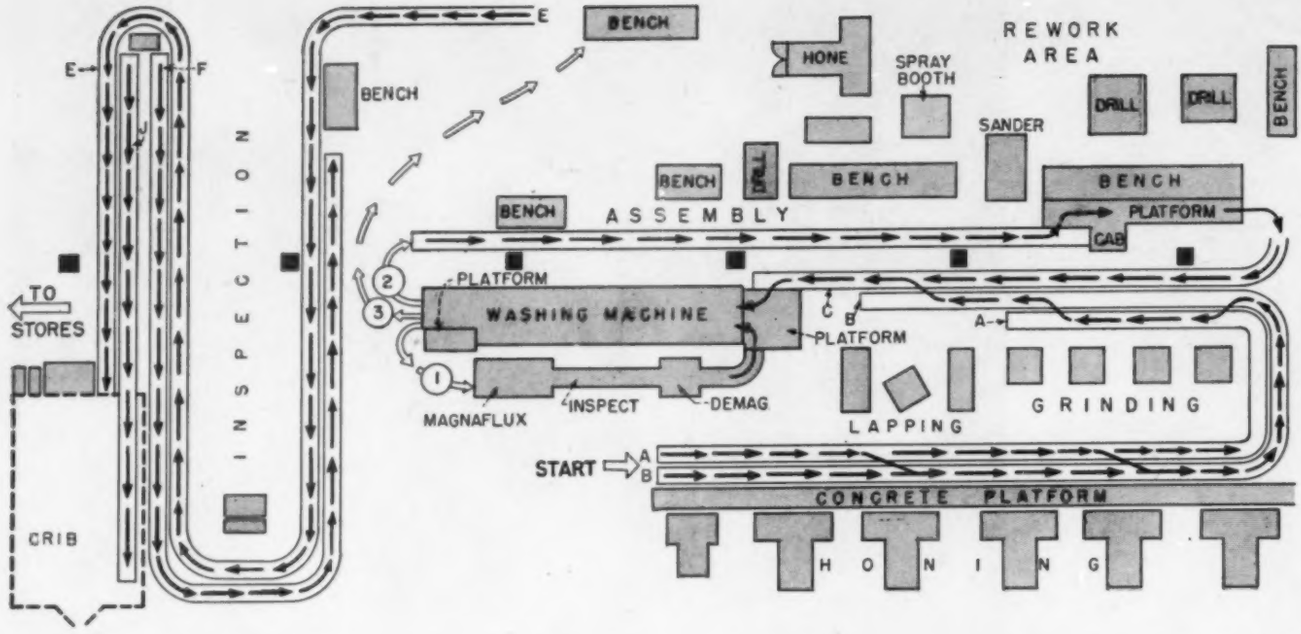
Small wonder, then, that materials handling has become of major management concern. In some companies, specialists have been appointed to concentrate on it. In others, consultants have been engaged to make detailed plant analyses, either in whole or in part.

Frequently, these studies reveal the need for layout revision. No plant can be more efficient than its layout. Number of handlings, distance moved, service to production—these are only a few of the items affected.

For top production at minimum cost, prime requisites are good layout and effective handling. How these are obtained is discussed in this report. Selected case histories illustrate the application of principles.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

Copyright, 1948, by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.



Partial layout of a product line illustrates material movement that is direct although it is not straight. Incoming parts move on roller conveyor *A* to any one of six hones set up for the same operation. After honing, parts are placed on *B* for movement to a stop, where they are transferred to *A* for movement to 2nd machine group, then on *B* to the third, and next on *C* to the washing machine. Parts pass (1) through magnaflux, inspection, demagnetizing and through washer a second time. Clean work travels (2) on *D* through a series of operations where parts are added. Assemblies move on *C*, through the washer, then (3) on skids to the bench, and to conveyor *E* for inspection. Rejects are tagged, but continue until inspection is completed, and then are placed on *F* for return to the rework area. If not repaired, rejects move on *J* into the crib for the attention of supervision. Finished assemblies move from *E* to stores. Wide spacing permits supplying hones from an aisle if required

How Much Effect Has Handling?

PLANT LAYOUT is first of all a function or technique, secondly a plan or arrangement that results from the application of the technique. Materials handling likewise can be discussed from the viewpoint of an orderly approach to the solution of a problem and also in terms of the physical equipment that makes it possible to put the solution into effect.

It is our purpose to discuss plant layout and materials-handling principles as an integral subject and to study physical plant arrangements as they are influenced by materials-handling systems.

The over-all objective of a layout program is to spot the proper equipment for the best method in a location which will permit the most efficient processing of each production unit in the shortest possible time through a minimum distance.

Thus, materials handling is an inherent part of plant layout. The two are inseparable and study of one invariably leads to analysis of the other.

There are two basic situations to be considered. The first is making a layout for an entirely new plant. The second is rearranging an existing plant.

In a new plant, materials handling is a major factor in determining layout. It affects the location of departments relative to one another, the placement of machines within each area, the allocation of space for storage, and the design of the building itself.

In an existing plant, the extent to which handling may affect layout depends upon whether the savings to be obtained will justify the cost of making changes, whether handling methods are to be analyzed and revised in only a few departments or plant-wide.

The first situation is encountered less frequently. By far the greater number of cases involve devising a layout and a co-ordinated handling system that must be made to fit the limitations of an already existing building.

In either case, the principles remain the same but, in existing buildings, the solution is affected by the physical characteristics of the available space.

Build Around the Layout

Because so much depends upon it, the need for careful planning cannot be over-emphasized. Under no circumstances should new buildings be constructed before a scale layout is made. Such a course may cause needless expense to alter the structure to suit the needs of handling in the process, or, if this is impossible, may force acceptance of less-efficient handling methods in part of the sequence.

Stressing this point must not give the impression that the only solution to handling problems is to erect a new building. Though this is ideal, inability to build should not discourage other efforts to improve existing conditions.

The idea that it is impossible to do anything about a multi-story building, for example, is far from true. Modern handling equipment is extremely versatile and there are multi-story plants today in which operating efficiency is as high as could be obtained in a single-story building. This is possible only with proper layout for the correct handling methods and depends to a great extent upon the nature of the process.

Likewise, plants that are fundamentally job shops in their production can be laid out for low-cost handling.

It takes time, money, and effort to make a thorough plant analysis, but the potential savings more than justify the expense. Furthermore, entire plants need not be analyzed in one project. Areas in which costs are highest may be studied first.

The same principles apply whether the layout project stems from a materials-handling survey or from other needs, such as increased production schedules, and whether it involves an entire plant or sections of the building.

Layout Requirements Created By Handling

THE BASIC concept in layout is flow. Factory buildings are no longer thought of simply as housings for an assortment of machinery but rather as integral production units channeling a smooth flow of materials through manufacturing processes. And a vital part of the unit—the part that actually produces the flow—is the materials-handling system. Thus, a prime consideration in layout is to satisfy the needs of materials handling in the way that will enable maximum productive efficiency and lowest unit cost.

The over-all objective is to obtain direct-line flow in which materials with the greatest handling demand travel over the shortest distances in the minimum time.

Direct-line flow means that material starts at one end of the plant and travels progressively toward the other end. This is the ideal. Actually, the flow need not be straight; it may be U-shape, or even a series of U-shapes. All potential points of congestion and delay must be minimized, and toward this end, back hauls and cross flows are generally avoided. Yet, even these may be permitted, if they can be planned so no confusion results, as is oftentimes possible with overhead equipment.

The location of receiving and shipping docks is a guide in determining the general flow plan. These areas, respectively, mark the beginning, with the receipt of raw material, and the end, with the shipment of the finished product, of the internal transportation in the plant. Hence, they are key points and influence the location of other departments.

In planning a new building, the practical approach for the railroad spur and for truck roads must be considered in determining the

Unit loads reduce the handling cost per piece by enabling the movement of larger volumes at one time. Layout should provide conditions favorable to the operation of equipment, including direct routes free from congestion or interference

shape of the structure and its placement on the lot. Once decided, these features fix the approximate location of receiving and shipping.

The same is true of an existing building. In addition, there may be other features that create fixed points. These include such installations as plating tanks, baking ovens, or heavy equipment, that are, in effect, part of the structure and may be so expensive to move that relocating them cannot be justified on a cost basis.

Plan the Routes

The over-all flow will depend upon the location of departments in relation to operation sequence and to fixed points. Hence, careful study of this phase of layout is required to achieve the second part of the over-all objective—namely, moving material with the greatest handling demand over the shortest distances.

Flow within departments also must be planned and terminal points for incoming and outgoing material should be arranged in accordance with the general flow pattern. Details of internal flow depend upon the internal arrangement of the department. These arrangements vary in different areas and will be described in later sections of the report.

In addition to creating a smooth flow plan, the layout must also permit good handling methods. There is the "best way yet devised" for performing handling operations just as there is the "best way yet devised" for performing machining, assembling, or other operations. Developing the best method requires a study of containers or other load units, the equipment for moving them, and the integration of handling methods in one area with those in other areas.

After the handling system is planned, conditions that will enable its efficient operation are established. These requirements include allowing adequate clearance for specific equipment in all areas in which it operates and allowing sufficient space for storing materials. One of the greatest hindrances to good handling is the congestion that comes from inadequate space for material storage. This occurs when too little thought is given to the *actual load* of material that will be in various departments and at each machine at any given time.

All work areas must be accessible, afford ample space for material, and have facilities at the area to enable good part handling.

The over-all project also must do more than insure good handling between work points. Of prime importance are the inches of handling. Every workplace must be arranged in accordance with the principles of motion economy to eliminate unnecessary handling and to perform that which is necessary in the most effective manner yet developed.

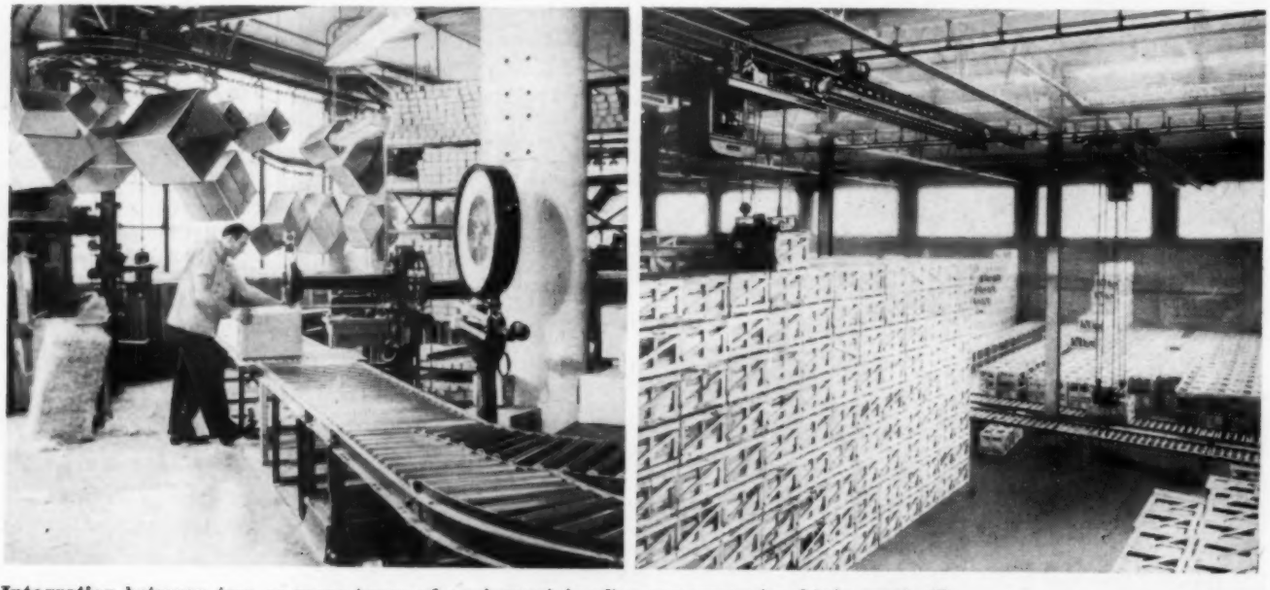
Raw material, work-in-process, finished parts, and product stores must be allocated in the light of management policy as regards purchasing and production plus specific operation characteristics. For example, machines with long setup times and short running cycles frequently require large banks of material ahead.

Purchasing can influence the lot sizes of incoming material and the manner in which it is packaged and shipped by the supplier. Production can control lot sizes of manufactured material and affect the requirements for work-in-process and stores areas.

In seasonal industries particularly, the decision as to whether to jump manufacturing loads currently to meet peak demands or whether to distribute the load evenly over the year and hold finished goods in storage for the rush period will have a direct bearing on the problem.

Provide for Expansion

Physical characteristics of the building are also a factor. The needs of the handling system set several design requirements in new



Integration between two or more types of equipment is often necessary to obtain most efficient utilization both of equipment and of space. No one handling method is best for all jobs

buildings and require a check to establish the limitations imposed by corresponding features in existing buildings.

Another important consideration is the future needs of the business. If production schedules are expected to rise, the ability of the system to move material through the plant in greater volume must be considered. The building itself must be designed so additions can be made.

Under any circumstances, the goal is a layout that fulfills the needs of a handling system that will do the following:

1. Enable low-cost machine operation . . .
   a. . . by keeping an adequate material supply on hand to avoid down time waiting for parts.
   b. . . by delivering material within easy reach to avoid lost motion in the operating cycle.
2. Provide low-cost handling. . .
   a. . . by eliminating operations through modern methods.
   b. . . by increasing productivity of handling labor.
3. Protect the item from damage in transit.
4. Permit close control over inventory.
5. Afford adequate safety to employees.
6. Obtain effective utilization of cubic space.
7. Make possible lower over-all time of production.

Effective planning requires complete data on the problem. From it, improvement possibilities may be noted, costs computed, savings estimated, and a decision made for each of several choices as to whether the proposal is economically justified. Possibilities are, (1) improving handling only, (2) improving handling in conjunction with revision of present layout, or (3) going to new construction.

Obtaining the necessary information and using it to devise best methods in accordance with the principles of good handling is the purpose of a materials-handling survey.

How to Analyze Handling

DATA may best be collected by classifying the plant into areas, such as receiving, storage, individual manufacturing departments, warehousing, and shipping. The characteristics of the material itself and the nature of the flow varies from one stage of processing to another. Classification will enable the analyst to study each phase individually and to determine the best method in each area. These various proposals may then be integrated into one over-all system. In this way, the total problem is solved by breaking it down into a series of small problems and then integrating the solutions.

Similarly, within each area, the study proceeds by considering each handling sequence by itself, and also in its relation to other sequences. For example, the method by which castings move into raw stores is analyzed; the same is done for sheet, bars, purchased parts, and so on.

In many plants there is a large variety of items and the handling operations are complex. Frequently, however, a small percentage of the production comprises a large percentage of the handling work. Selecting the material or the parts that form the major handling demands enables simplification of the study. If there are no dominant items, typical or representative parts may be selected. Detailed data within each area can be obtained for these items and they can be the nucleus in developing most efficient methods.

For remaining items that involve a small percentage of handling work, it may be necessary to apply equipment not best-suited to these needs. But this condition can be tolerated if major handling requirements can be fulfilled, for it is seldom that any one system, even if two or more types of equipment are integrated, will fit all needs.

Break Down the Work

The movement of materials through industrial plants may be divided into two major elements, handling and transportation.

Costliest and deserving of the greatest attention is the element of handling. Handling is picking up and putting down material, whether it consists of transferring pieces one by one by hand from freight car to skid or of raising in one lift a pallet loaded with a large number of pieces.

Much of the total expense of getting material through the plant can be traced to this element. Hence, many of the important principles of materials handling are concerned with minimizing its effect.

Chief among these are:

1. Eliminate needless handling; it adds no value to the product, only cost.
2. Coordinate handling with production.
3. Handle in large units.
4. Avoid breaking bulk.
5. Use mechanical aids, and power, if justified on a cost basis.
6. Minimize rehandling.
7. Deliver material to production operations in position for easy reach to avoid lost motion in the operating cycle.
8. Integrate systems.

These principles account for the development of unit loads, of handling equipment that both picks up and carries, and of various schemes for supplying parts to the right position at the workstation. All affect layout and are discussed in later sections.

Directly related to layout is transportation—the actual moving of material from one point to another. Distances and flow objectives affect not only departmental location, as previously pointed out, but also the actual internal arrangement of departments, as will be explained later.

Obtain Complete Information

Recorded data for the part under analysis may be on a conventional flow process chart or on a special form that best suits the needs of the study. Necessary information includes:

1. The nature of the material—whether pieces, as castings; bundles, as rod or sheet; cartons, as finished parts; pallets; or bulk.
2. The nature of the load—size, shape, weight.
3. Handling operation required.
4. Number of men employed on the operation.
5. Time of performance.
6. Units in each load.
7. Weight of load.
8. Origin and end of each move.
9. Distance moved.
10. Moving time.
11. Whether the move is in one building, or in one bay, or on one floor.
12. Rate of use of material.
13. Number of moves required.
14. Height of tiering.

Individual operations may be analyzed for improvement in line with the principles of good handling.

For the over-all picture, flow diagrams may be drawn on the building floor plan to outline the route and to translate distance into a flow pattern. This is the best way to grasp the significance of layout in the handling problem.

Plant Layout Procedures

BECAUSE so many projects are for an existing process in an existing building, the following technique applies to that situation. If a new process is involved the same steps are necessary but the data are based upon estimates from working drawings. With a new building the procedure is similar but the actual work is simplified by the removal of many of the physical limitations that are present in existing structures. Although the result of a layout project is a composite arrangement of facilities linked by an integrated handling system, the technique consists of the study of details. Small problems are solved one by one and the answers are combined until the whole job has been accomplished.

Clearly illustrating this procedure, the major steps in layout are:

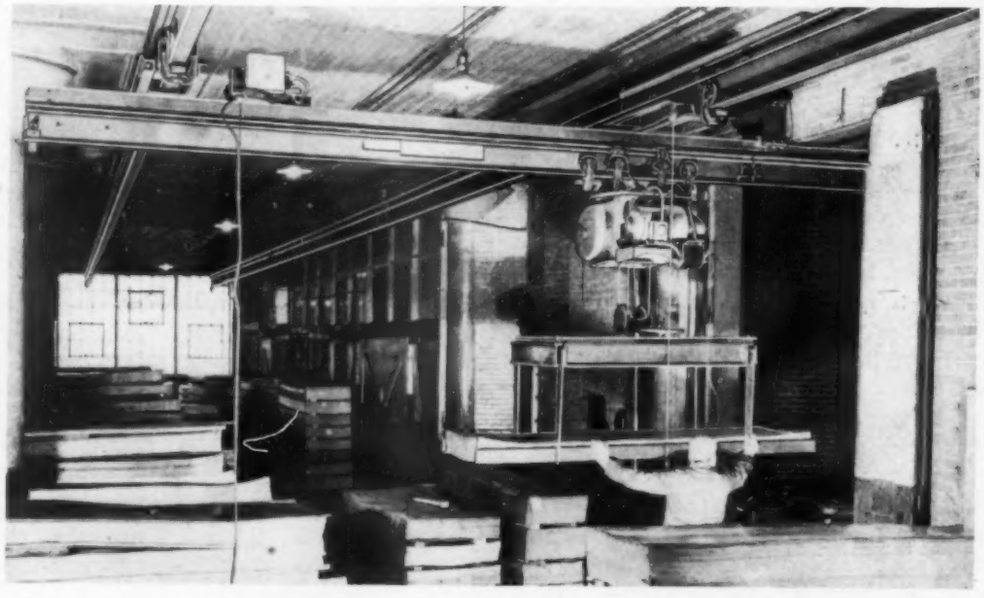
1. Complete survey of the work.
2. Classification of data.
3. Determination of equipment needs.
4. Computation of space requirements.
5. Allocation of area.
6. Internal departmental layout:

a. Receiving.
b. Raw stores.
c. Manufacturing.
d. Processing.
e. In-process stores.
f. Assembly.
g. Inspection.
h. Shipping.
i. Warehousing.
j. Other areas.

7. Cost estimates.
8. Final drawings.

Every layout is based upon a given set of conditions. The first step then is to collect complete information about the manufacturing process for which the layout is to be made. This involves the following procedure:

1. Determine the production requirements.
2. Break down the product into sub-assemblies and component parts.
3. For each part determine whether it is bought outside or manufactured.
4. For final assembly, each subassembly, and each part, list in sequence all manufacturing and inspection operations.
5. Determine material requirements.



High-stacking makes use of the cubic content of the building and releases valuable floor area for productive purposes. Equipment that both picks up and carries avoids rehandling at each end of transports, saving labor and speeding movement. Equipment for such service is made in a variety of types and sizes in both floor and overhead types

6. Note the time for each operation.
7. List the machines upon which each operation is to be performed.
8. Record the tools required, special fixtures, attachments.
9. List any special requirements of the work.

The economies of other methods of manufacture should be considered. For any changes, time estimates for the proposed method will have to be made.

Organize the Data

When the entire sequence of the proposed method is known, and the production goal is established, it is then necessary to organize the data to determine equipment needs. Steps are:

1. Classify the data on the basis of product or operation, and compute total requirements.
2. Compute machine outputs.
3. Select proper number of machines for balanced output.

Having decided the kind, number and general arrangement of the necessary manufacturing units, as well as the production scheduling on the equipment, the next step is to determine space requirements for the allocation of area. This is done without regard to the internal arrangement of departments. One way is to compute a figure from the size and number of machines required plus an allowance for aisles, work areas, and work-in-process stores. A second method is to use area figures of present departments adjusted to allow for proposed changes.

In addition to the detailed procedure for determining machine requirements and space arrangements, there is also a simpler method that is particularly applicable to job-shop operation. Step one is to tabulate all present equipment plus the loading on each machine. Attention is then focused on any unbalance in loadings to determine whether work assignments can be shuffled to restore balance, or whether additional units are needed to relieve overloading and to reduce the congestion and bottlenecking that is certain to accompany such a condition. Additional temporary storage may also be indicated.

Similarly, if an increase in production is anticipated, the effect must be evaluated in terms of loading. If machines are currently close to their top capacity, allowance must be made in the equipment schedule or space will be reserved for adding other units as required.

Material needs are determined from present inventories. Proper adjustments are made if abnormal conditions prevail. To account for proposed increases in output, a flat percentage is applied to present stocks.

All existing facilities are similarly treated. Actually, this is simply a different approach to getting the data required for layout. Rather than working from the product and an operation basis to build up to machine requirements, the operating conditions within each department are noted and a judgment is formed as to the adequacy of current equipment for the given volume. Adjustments are then made to eliminate present poor conditions and to allow for future changes in volume. Schedules for machines, material, and equipment are then drawn.

Space requirements are similarly determined from existing departments with appropriate percentage adjustments to correct for congestion and to allow for expansion.

The remainder of the procedure is the same for both approaches.

Allocate Areas

In fitting the sequence to existing space, complete data regarding the physical characteristics of the area must be compiled and used. These include such features as permissible floor loads, strength of roof structure, and any limiting factor in the building.

Also required at this stage is an outline drawing of the plant, showing the location of columns, partitions, doors, windows, and any structural features that might interfere with the layout. Elevations and cross-sections should also be obtained.

It is then possible to allocate the estimated departmental areas to given sections of the building. This may be done by blocking out the area and superimposing it upon the desired section to check whether it will fit.

It is in this step that the overall flow plan is determined in accordance with the general objectives already explained. The details of handling and of operation sequence contained in the data accumulated for the study, are particularly useful to show how, and in what volume, and in what sequence material moves. Analysts who are thoroughly familiar with the products and manufacturing sequences in their plant make good use of their experience by doing this part of the job with the minimum of data.

Arrange Equipment

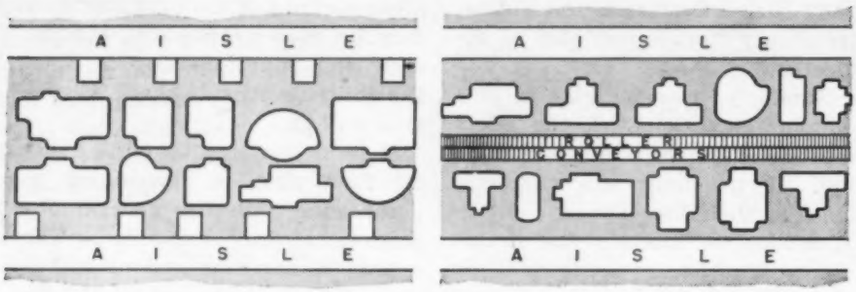
When department locations have been fixed and the flow pattern is established, internal arrangements are laid out. Specific handling methods must be known at this point. Templets or scale models are made to express the spacial needs. This practice makes much easier the visualization of the proposed arrangement.

Although complete details of standard practice as regards the tools of layout, such as templets, models, and boards, are omitted, it should be mentioned that materials-handling engineers are tending more and more toward showing handling facilities on their layout boards.

Scale models are becoming more popular and permit quick visualization of conditions as they will exist, because they show cubage in space. Such models of materials-handling equipment, containers, and racks permit checking the layout to determine that no interference with machine operation or with other material at the workplace will occur as loads are moved in and around machines.

As the detailed layout is made for each department, it is necessary to refer back to the original allocation to insure staying within the limits of space. Actually, compromises are usually necessary, shrinking some areas and enlarging others.

Making the layout is not a one-



Product line layouts vary with the handling employed. For example, machines at right face the conveyors and are supplied from them; those at the left face the aisles and material is delivered to them by truck. Both layouts require the same bay width

man job. Nor is it a job that will be finished when the first arrangement is devised. It is a task on which line supervision and staff executives should participate. Suggestions should be pooled and revisions made until the best possible layout is obtained. Layouts are not then set aside and forgotten. Boards should be kept up to date for reference and guidance in any proposed changes of the future.

This description of layout procedure omits numerous details, such as, a list of all areas; methods of equipment identification; methods of balancing output; questions of heat, light, location of power and air lines; and other factors that must be included in the overall-job. This is done to devote greater attention to the handling phase of layout.

Handling Equipment

The development of an efficient layout requires complete familiarity with all types of handling equipment and with the various containers and racks used for transport and storage.

For nearly all the handicaps that an existing building may present, there is some form of equipment that will alleviate them and permit the proper layout.

Close cooperation with equipment manufacturers is essential. It enables the user to take advantage of their experience with a wide variety of problems and is a safeguard against improper applications.

The use of mechanical equipment requires consideration of the physical characteristics of the structure. New buildings can be planned to provide ideal conditions; existing buildings can be surveyed to determine actual conditions.

Among the points to be considered are: aisle widths; floor loading, size, capacity headroom, and location of elevators; composition and condition of flooring; width, percent grade approach and crest clearance of ramps; doorway heights; strength of columns; headroom; clearance along all routes of equipment travel; location, load-carrying ability, and height of supporting beams and lower chord trusses; variations in floor level or roof slope.

Discussion of these features is omitted because the details vary with each installation and exact data required for decisions on each point can be obtained from the manufacturer of the equipment.

It is also wise to contact other sources of information such as, consultants, architects, contractors, trade press, and literature, and to study existing layouts and handling systems that are operating successfully.

No one type of equipment is best for all jobs. The nature of the handling problem itself changes during manufacture. The characteristics of the problem must be noted, compared to the capabilities of available equipment, and weighed in the light of the cost of possible methods.

Layout in Individual Departments

Receiving—Stores—Warehousing—Shipping

OPERATIONS in these areas are predominantly handling and offer great opportunity for the application of good methods. Handling in unit loads, application of power equipment, and the avoidance of rehandling are the chief elements of good practice in these areas of Metalworking.

In receiving and shipping, speed is essential to avoid congestion and demurrage charges. Loading docks must be proper width and adequate height for economical operations. Vehicle floor and dock should be near the same level.

In stores and warehousing, the objectives are to obtain maximum utilization of space, to segregate material, to provide accessibility to it, and to enable close control over inventory. These are attained by material layouts in which there is a place for everything with proper coding to fix its location, adequate racks and bins; and material containers or other load units that permit high stacking.

Stacking systems involve requirements that are directly related to the physical layout of the area. These considerations are disdiscussed around the pallet as an example, although many unit loads are not palletized.

Points to be questioned include,

1. Size of the pallet and space between columns.
2. Height available for stacking.
3. Permissible floor loading.

The column spacing in the storage area should be some multiple of the pallet dimensions plus an allowance for side clearance. This clearance is an important point.

PROCESS LAYOUT

Advantages:

1. *Lower investment in machines because of less duplication. Only enough machines of each kind are necessary to handle normal maximum load. Overloads usually can be met by working overtime.*
2. *Possibility of keeping all machines in constant operation is a maximum.*
3. *Greater flexibility is present both for getting work done and for changing operation sequences.*
4. *Supervisors become more highly skilled in the operation of equipment in their department.*
5. *Total costs per unit may be lower when the plant is not near peak capacity. Labor costs per unit and unit overhead costs at moderate production will be less than on product setup.*
6. *Machine breakdowns do not hold up a succession of operations.*

Disadvantages:

1. *More handling of material over longer distances.*
2. *More back-hauling and cross-flows.*
3. *Production control is more difficult because there is no mechanical control over sequence.*
4. *Total time of production is greater because of transportation and the necessity for moving work into a department before it is needed to avoid holding up machines.*
5. *Work-in-process inventory is higher because of banks of work ahead of and after machining, delays at inspection, and waiting for move men.*
6. *Space required per unit of product is greater because of the needs of work-in-process storage and handling.*

Too little space between stacks makes it difficult for the truck operator to position the pallet. Extra care is required and extra time is taken. Thus, savings in space must be weighed against the cost of increased handling time to determine the arrangement that results in the lower over-all cost.

Close spacing also requires slightly wider aisles, because a nearly straight withdrawal or placement is necessary. With wider clearances the operator can swing the load before it is entirely removed from the stack and less aisle space for maneuvering is needed.

Load overhang must be considered. For example, some organizations recommend that bags overhang 2 in. to avoid their being damaged by pallet corners.

Although clearance is an important detail, there is little information available as to the exact amount required. Three or four inches between stacks is considered reasonable, although some experts recommend as much as six. Thus, the pallet dimension plus an allowance of 4 to 6 in. is the basic figure around which column spacing should be planned. The final result, of course, may be a compromise between a good floor arrangement and an economic building design.

In addition to effective use of floor area, it is also necessary to plan for maximum utilization of the cubic content of the storage space. The question of stacking height involves the density of the material, the dimensions of the pallet, the height of the unit load, strength of packages to resist crushing, clearances required beneath sprinklers and other ceiling fixtures, and resulting floor loads.

Manufacturing

There are two chief types of layout found in the metalworking industries. In a process layout, departments are set up on the basis of the process employed in production. All like machines are grouped together in separate area. Under this arrangement, all punch presses are in one section, drilling machines in another, screw machines in a third, and so on. Raw material is transformed into a completed part by passing in batches from one department to another, and oftentimes back again, in whatever sequence is dictated by the operations.

In a product layout, all the equipment needed to produce a given unit is arranged within a department in the sequence in which the operations are performed. Material moves in a direct line from the first operation through successive steps to completion in one department.

Product layout, though particularly well adapted to mass-production industries, can be applied to products not in this category. The main requirements are the ability to balance capacity between operations and the volume to maintain so-called "continuous" operation.

Actually, few plants are purely one or the other, but it is not uncommon to find combinations of the two. The final decision as to which layout is best for a given problem must rest upon an engineering analysis to determine how to obtain lowest unit production cost.

There are certain advantages and disadvantages to each of the two methods of machine layout. Those for process layout are listed in the accompanying tabulation. The advantages and disadvantages of product layout are the opposite, respectively, of those for process layout.

Practically all the disadvantages of the process arrangement arise from the handling required in such a plan. These are overcome in product layout. Hence, if handling were the only consideration, this latter arrangement would be the logical choice.

Handling Factors

In the process layout the chief considerations are ample terminal areas for in-coming and out-going material, adequate facilities and space for moving material to and from each piece of equipment, proper space for containers both for unworked and finished parts, and delivery of work for economical machine operation. The last point requires recognition of motion economy principles on units that are fed manually. The operator should be able to obtain material without leaving his work area and with a minimum of bending and stooping. Wheeled vehicles aid in positioning material supplies at work stations. All the major type of handlng equipment are found in this service.

Layout for product establishes a definite line of flow. Although this is often done by placing some type of conveying equipment between related machines, trucks and wheeled carriers are also used.

Judgment Is Essential

When installing mechanical handling, it is very important to bear in mind that there are other operating requirements in addition to handling. This caution will be a safeguard against situations such as the following cited by a leading consulting firm as an example: In a certain plant, an elaborate mechanical conveying system was installed to move parts from operation to operation. Whenever the machines had to be changed over to produce another item—which happened about once a week—the conveyor so interfered with the setup work and the movement of tools, jigs, and fixtures that the downtime and changeover costs were excessive.

In most layouts, this equipment delivers the material either directly to the working area or within easy reach of the operator and often prepositions the part for the subsequent operation. This enables a smooth motion pattern in the operating cycle, thus permitting maximum production and reducing worker fatigue.

The handling device acts as a work-in-process area and holds banks of work between operations such that tool adjustments and minor repairs can be made without interfering with the operation of the line.

When manufacturing heavy apparatus, materials handling considerations dictate the operations that are included in one bay. Insofar as the location of machines relative to one another is concerned, the influence of handling is slight compared to its effect on the layout of equipment in which the handling part of the operating cycle is highly repetitive.

Circular Arrangements

Space patterns radically different from the conventional straight-line arrangements have resulted from two fundamental ideas. One is to put down a part in the position at which it will be picked up for the next operation; the other is to utilize the idle time of the operator during cuts under power feed. From these concepts have come roughly circular plans with two or more machines on the perimeter and the operator on the inside. A typical cycle calls for unloading, loading and starting machine 1, turning to machine 2, unloading 2, picking up part just removed from 1, loading part into 2, and so around the group, returning to 1 at the time the cut is finished. The part from the final machine goes onto the handling equipment for moving to the next group in the sequence.

This layout is in sharp contrast to the orderly pattern presented by machines lined along an aisle. Despite its hodge-podge appearance, the layout is highly efficient in the use of labor and machines and requires no work-in-process storage space at each machine.

Assembly

Assembly layouts fall into two groups, unit and progressive. In the former, major parts and subassemblies are accumulated at one area for final assembly of the product. In this case the flow problem is mainly getting the material into the area and the completed product out.

Outstanding example of direct-line flow in layout is the modern progressive assembly line. Individual parts, or groups of parts, and subassemblies are placed at adjacent work stations in the sequence in which they are joined and the product is built by passing consecutively from the first to the last station without delays or backtracking. There are countless methods of developing this fundamental idea.

Regardless of the design of the line, there are three basic flow problems involved: (1) moving the assembly from station to station, (2) supplying material to each station; and (3) transporting the finished product from the line. The solution to the first part keeps material on the move, enables producing with a lower work-in-process inventory, and results in a smaller ratio of storage to productive area. In effect, the transporting device becomes a production tool. Fixtures for holding the assembly frequently are of major importance in the setup.

The solution to the second and third problems requires the close correlation of handling and production. The closer this timing is, the smaller need be the work bank at each station and at the end of the line. Further space savings result if material is brought in on overhead equipment. Frequently, this equipment is used as a traveling storeroom to save floor space and to permit a more condensed layout. Particularly with bulky parts, layouts to permit such handling facilities are the answer to increasing productive capacity within existing areas.

Customary space patterns have subassemblies feed in at right angles to the main conveyor at the point of entry in the process, with operators at right angles or parallel to the line or moving with it for a given distance.

Processing

Processing operations are also adapted to mechanical handling. Layouts can be made for automatic movement of parts through complete processing systems with manual operations only at the start and

finish. For other levels of production, systems that are not automatic but yet avoid costly rehandling between operations can be planned.

Over-all

Handling in all areas of the plant can be co-ordinated to keep material moving with a minimum of handling and halting. From the over-all view, the control of material movements, made possible with modern handling equipment and good layout, permits a long step toward the ideal of material coming in at one end of the building, passing continuously through processing, and emerging at the other end of the plant a finished product.

The application of principles is illustrated by two case histories. One explains how a leading manufacturer of materials handling equipment designed his new plant around the handling system; the other describes what a well-known industrial engineering firm did to obtain effective handling in an existing multi-story building.

Handling Determines Layout In New Building

Low-cost production is assured at the new Yale & Towne plant in Philadelphia; good layout and effective handling are the answer. Facilities formerly housed in 22 buildings are now contained in one structure. Savings in the distance material moves range from 30 to 50%. Congestion and production bottlenecks are eliminated. The ratio of non-productive to productive labor is far lower. Quality is improved, and the over-all increase in productive efficiency shows dollar savings that fully justify the cost of the project.

Handling is the key to layout in the new plant. Storage and manu-

GENERAL FLOW CHART

Flow chart shows the movement of materials going into the manufacture of industrial trucks. The over-all flow is short and direct. Frames and purchased parts move in an almost straight line from receiving to shipping; manufactured parts take a U-shaped route. This is necessary because the plant manufactures five other lines of product and the layout must give maximum over-all benefit to all lines. How this is achieved is explained by the reasoning that placed each department in its present location.

Raw material is held in rough stores. It enters the area from receiving and leaves enroute to manufacturing sections. Rough stores, therefore, is bounded on the one side by receiving and on the other side by manufacturing departments.

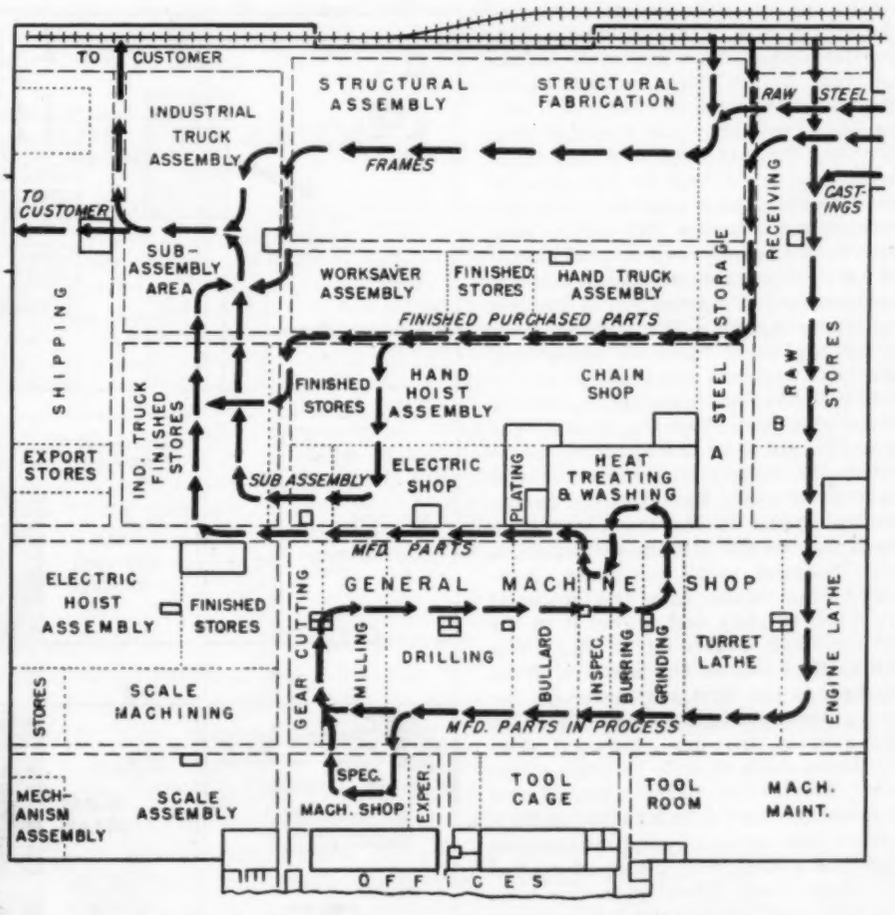
Heaviest manufacturing is done in structural fabrication and assembly. These items have the greatest handling demand and must move the shortest distance. Hence, steel storage is on the right of the department and finished truck assembly is on the left. Also served by the section, and thus placed adjacent to it, are hand truck and worksaver assembly.

The second fabricating department, the chain shop, is similarly planned, drawing steel from storage on one end and delivering finished chain to hoist assembly on the other end.

A third department drawing material over a direct route from rough stores is the general machine shop.

Virtually every machined part passes through the heat treating and washing; hence, this department is centrally located on one side of the general machine shop.

Final assembly is performed in six separate departments, one for each of the major product lines. Adjacent to each is a finished parts stock room. Purchased parts move from receiving directly to the stock rooms, as do manufactured parts from the machine shop. This arrangement makes it possible to move large unit loads from receiving or manufacturing over longer routes to stock. Parts are issued to assembly in smaller lots, and for this handling, the routes are shortest.



facturing areas are located to provide a smooth flow of material from receiving through manufacturing to shipping. Every workstation is planned for efficient production and is placed in proper relation to preceding and succeeding operations. The resulting layout attains the over-all objective of spotting the proper equipment for the best method in a location which permits the most efficient processing of each production unit in the shortest possible time through a minimum distance in all cases.

Because production is material on the move, the layout is designed to fulfill eight basic requirements:

1. Adequate facilities to receive, inspect and distribute the maximum anticipated influx of material.

2. Short routes to principal stores areas containing facilities to store maximum anticipated quantities of material and short, direct routes for movement of material to initial and subsequent operations.

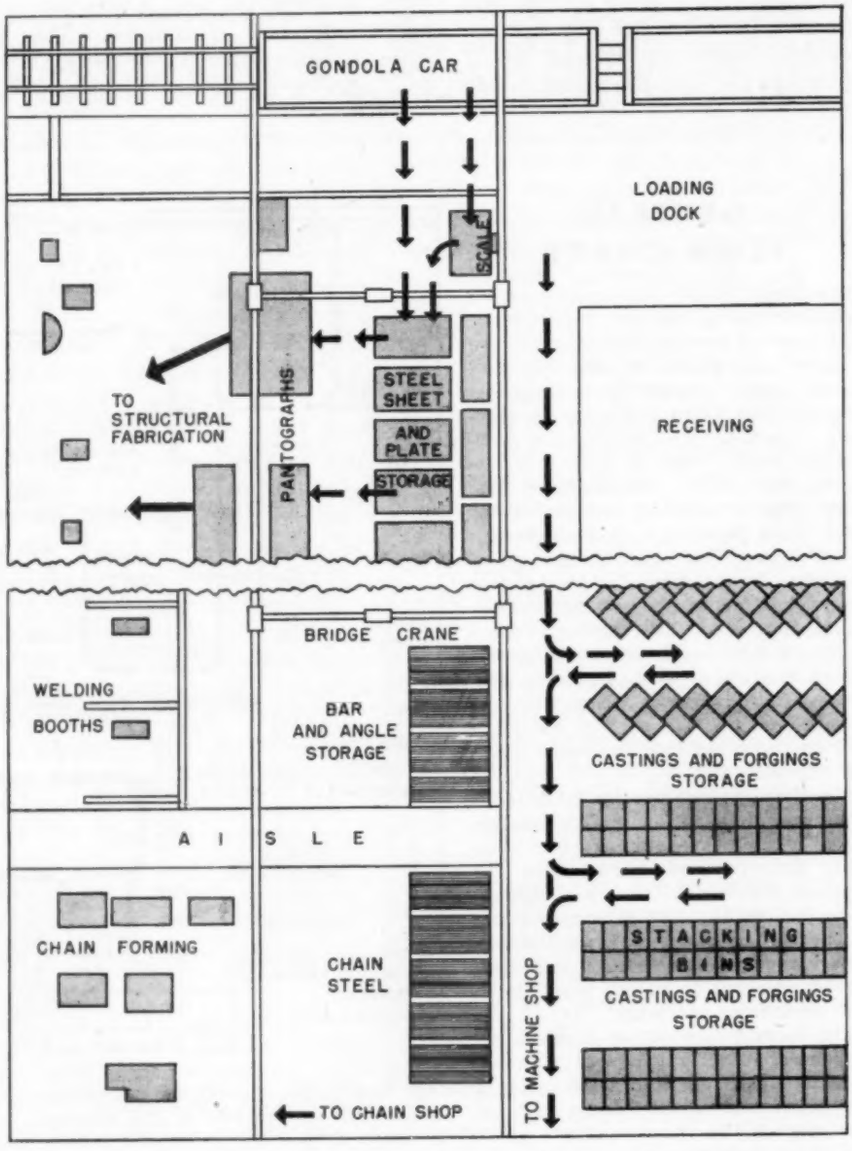
3. Proper arrangement of machinery and equipment in each department to provide ample room to place material within easy reach of workers.

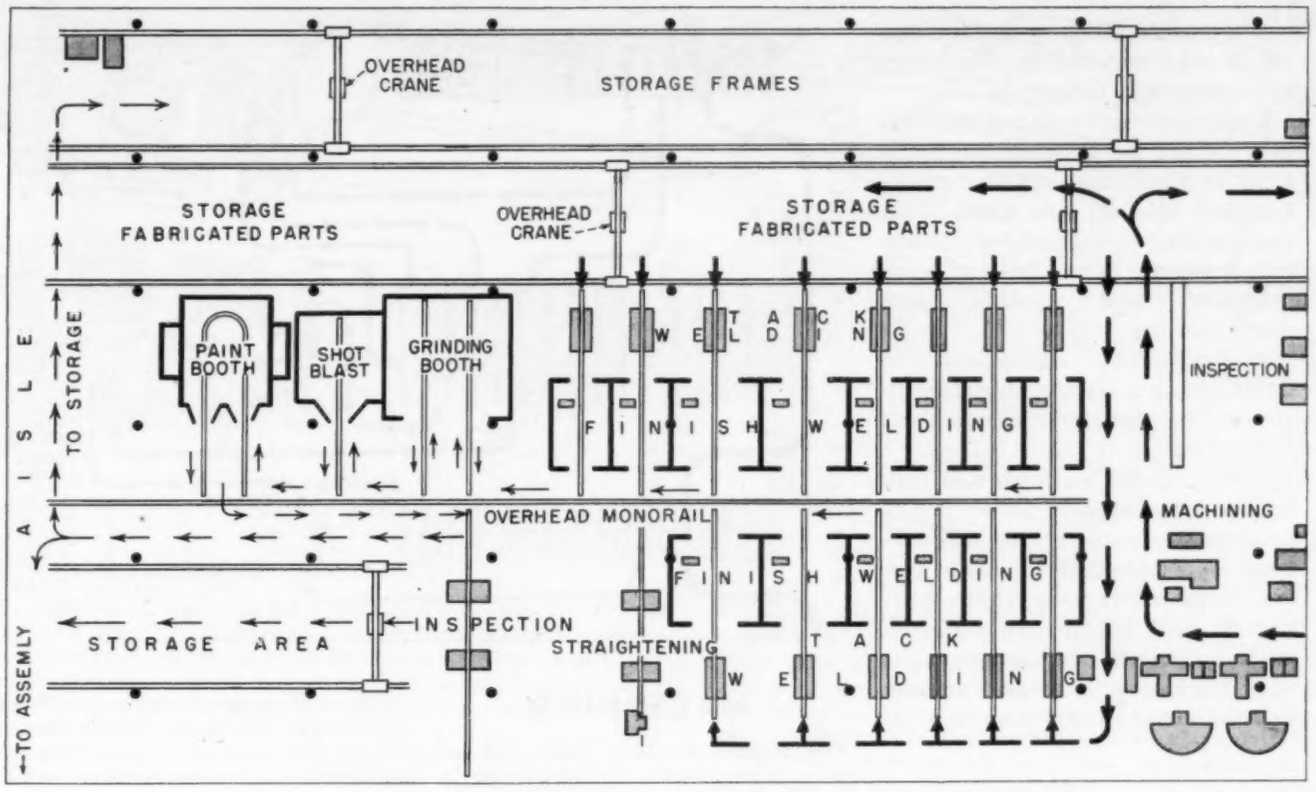
4. Free access to machines and assembly benches for quick delivery of material within each department and for fast pick-up of outbound material and waste.

5. Grouping of machines and departments so movement of material between operations is as short as possible, with a minimum of

RECEIVING AND ROUGH STORES

Objectives in flow and handling determine not only the relative departmental location of rough stores, but also the layout of the materials within the area. Rough stores is made up of two major sections, one for raw steel, the other primarily for castings and forgings. Steel storage stretches from the indoor track well to the general machine shop and is adjacent to the departments it supplies. The entire area is served by 3- and 5-ton overhead bridge cranes and contains racks suitable for the storage and segregation of various structural shapes. The general plan is for the same handling equipment that puts material into storage to deliver it to the first-operation equipment at one side of the bay. Cut steel moves from this point by the handling method of the department in which the material is used. For example, in the section closest to the track are open areas for the flat storage of the plate, and U-shaped racks for sheet. A 5-ton bridge crane lifts the material from the gondola and moves it to the proper stack according to size. The same crane moves the material from storage to the first cutting operation on pantographs and shears placed at the side of the bay. Material then moves on skids directly into the structural fabrication department. Down the bay are pigeon-hole racks for flats, angles, bar, and rod, and adjacent to the chain shop are U-shaped racked for chain steel. Directly in line with the steel bay is the turret lathe department. An overhead crane takes bars from a transfer point at the end of the area for direct delivery to the lathes. Castings and forgings are stored in skid bins tiered three and four high to a height of 9 ft. 3 in. and 11 ft. respectively. Part of the area is laid out for 45° stacking and aisles are 8 ft. wide; in the section planned for 90° stacking, 10-ft. aisles are required. The majority of castings and forgings go to the engine-lathe group for the first operation. Hence, lathes are placed adjacent to one end of the stores area. Indoor storage prevents weathering and eliminates subsequent cleaning that is necessary when material is stored outside.





STRUCTURAL FABRICATION AND ASSEMBLY

Steel, cut to size as it leaves storage, moves on standard skids to forming and machining operations in structural fabrication. Breaking away from strict process layout for machining work, several machines are grouped in this department to save haulage of bulky parts to the general machine shop. After the last operation, parts go on stacking skids for temporary storage in an adjacent area. There is no re-handling of individual parts. As required, members travel on the same skids to surface plates outside the 18 welding booths. From here on through the department, mono-rail hoists are the primary means of handling. Lifting and transporting is combined in one piece of equipment and the space for moving a bulky assembly need be only slightly greater than the size of the product. Tack-welded in the first operation, frames are lifted from the assembly fixture by a mono-rail hoist and pushed into the adjoining booth for finish welding. The hoist is returned to the tackwelding station and a second hoist moves the frame after finish welding to a heavy-duty mono-rail that stretches the length of the department. Along this track, handlers move the frames to straightening, grinding, shot blasting, painting and inspection operations. Completed frames move by truck or trailer to the adjoining storage area, where they are picked up by cranes and close stacked, leaving only narrow aisles for walking. High space utilization is thus attained.

back-tracting and needless hauling.

6. Adequate storage facilities for material in process between operations.

7. Stock rooms and tool cages with facilities to receive, store, inventory and disperse parts and tools with minimum handling and effort.

8. Facilities to pack or crate finished products efficiently and to ship by all classes of carriers.

Satisfying these requirements permits a handling system that can move and store material efficiently with minimum effort, maximum safety, and in the shortest time consistent with over-all economy.

The design of the handling system involves three primary factors: the *method* by which each principal handling operation is done; the *equipment* to put the methods into effect; the *integration* of equipment into an over-all system. These are applied to fulfill the requirements established by a thorough analysis of the principal handling operations at each stage of the manufacturing process.

The material to be handled varies widely in its physical characteristics, and as it passes through successive stages of machining, fabrication, and assembly, it further changes in shape, size, weight, and finish—all of which affect the manner of handling.

The general production plan calls for parts to be machined and fabricated in economical runs—usually equivalent to several months requirements. Naturally, this requires storage of finished parts and units before release to the assembly departments.

These factors lead to a system that requires many different types of material handling devices which fall into three basic classifications:

1. *Portable Carriers & Containers* to hold material on the move, in process, and in storage.

This requirement is for material that cannot be handled mechanically by itself, and includes stacking skid bins in two sizes, plain and stacking skids, pallets, trailers, self-dumping bins, dollies, rack conveyors and special-purpose work carriers.

2. *Mechanical Equipment* to move, lift, and stack materials with and without the use of carriers and containers.

This includes platform and fork trucks, several models of power handtrucks, bridge cranes, an overhead monorail chain conveyor, two floor-type continuous chain conveyors, and nearly two miles of mono-rail hoist installations.

3. *Stationary Storage Facilities* to hold loose material as well as the loaded carriers and containers.

This equipment comprises several types of sectional steel shelving for finished parts and tools, skeleton racks for skidded loads and miscellaneous racks for raw material.

This equipment is integrated into a plant-wide system by means of an over-all operating plan that assures maximum utility and economy. Generally, equipment assigned to a given department will be supervised by that department, whereas the operation of nearly all units of portable power equipment for material movement within and between departments will be under the control of a central material handling department.

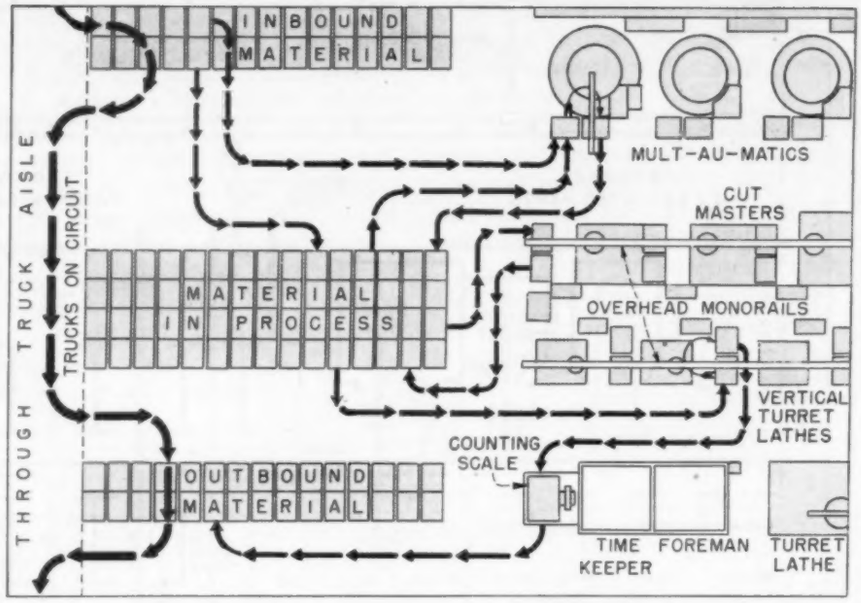
Throughout the building unit loads are moved, equipment best suited to the operation is applied, and rehandling is avoided by complete integration of equipment and methods.

How the application of the best principles of material handling affected the plant layout is described in these pages explaining the relative location of all major departments and the internal arrangement of sections of receiving and rough stores, structural fabrication and assembly, and general machining.

We Acknowledge . . .

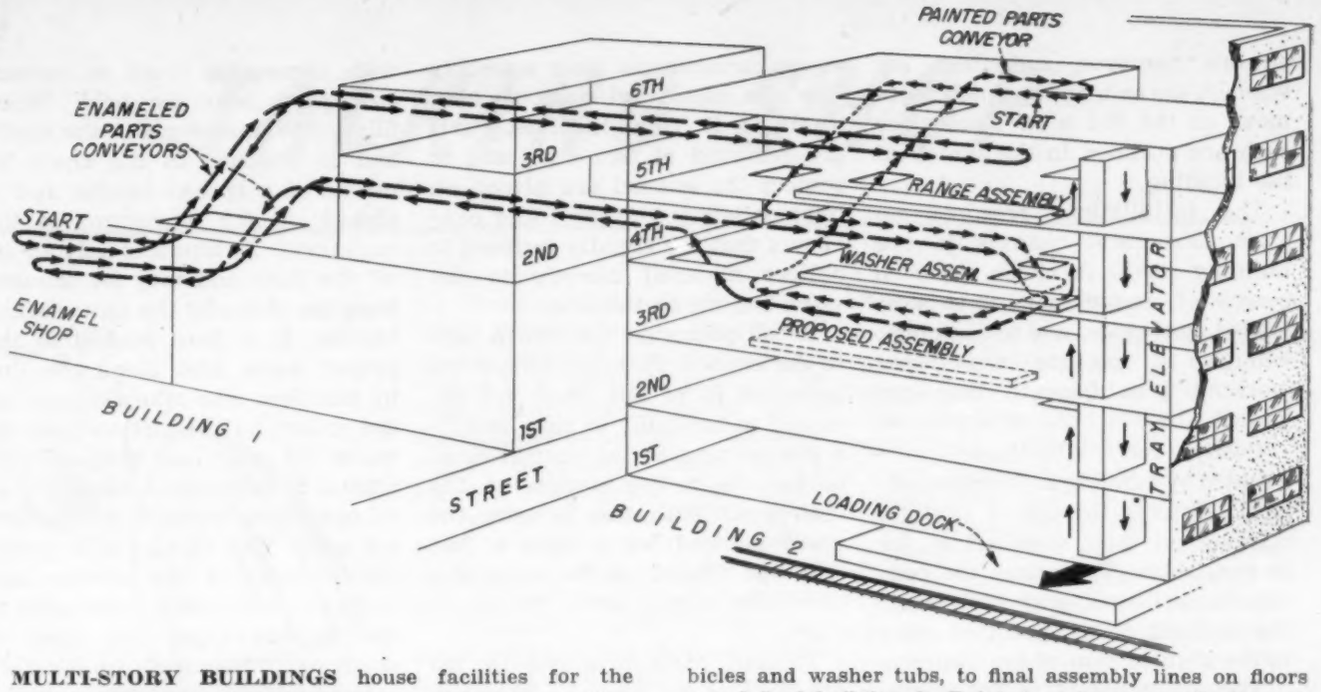
the generous cooperation given by the following firms and organizations in the preparation of this report.

Albert Kahn Associated Architects & Engineers, Inc.
Anderson-Nichols & Co.
American Engineering Co.
American Monorail Co.
Atlas Car & Mfg. Co.
Automatic Transportation Co.
Baker-Raulang Co.
Barrett-Cravens Co.
Chisholm-Moore Co.
Clark Equipment Co.
Clark Materials Handling Equipment Co.
Cleveland Crane & Engineering Co.
Comet Metal Products Co.
Electric Industrial Truck Association
Elwell-Parker Electric Co.
General Electric Co.
Gemar Associates
Harnishfeger Corp.
Hyster Co.
International Harvester Co.
Lamson Corp.
Landers, Frary & Clark
Link-Belt Co.
Lyon-Raymond Corp.
Manning, Maxwell & Moore, Inc.
Mercury Mfg. Co.
Methods Engineering Council
Philadelphia Tramrail Co.
Prof. George Hageman
Robbins & Myers, Inc.
Standard Conveyor Co.
Towmotor Co.
Visual Production Planning, Inc.
Westinghouse Electric Corp.
Wright Aeronautical Corp.
Yale & Towne Mfg. Co.



MACHINING

The general machine shop, laid out on a process basis, contains seven individual departments, according to type of machine tool. To reduce travel to the minimum, departments are positioned according to the sequence and frequency of operations on typical parts as determined by an actual survey. Each department has an adequate work-in-process area. This is divided into three sections, one for incoming material, one for work held ahead of the department, and one for outgoing material. Route trucks deliver to the "In" section from which bins are moved by departmental handtrucks, either direct to a machine or to the work-ahead section. Parts on which operations have been completed are spotted in the "Out" area. Handling between departments is specifically designed for flow in both directions. A circuit has been set up to include machining, heat-treating, washing, and inspection, and trucks follow this established route. Trucks pick up material from an "Out" area, move it to the designated "In" area, seek material in the "Out" area of this department. If there is none, they proceed to the next "Out" area, and so on around the route. The internal arrangement of each department is based upon 40-ft. bays, with 20 ft. allotted to machines and 10 ft. allowed for the aisle. Machines are back to back and each is supplied directly from the 10-ft. aisle. Ample space for material bins is allowed at each machine, and hoist and rails are provided not only for heavy parts, but also for heavy fixtures and machine attachments.



MULTI-STORY BUILDINGS house facilities for the manufacture of Universal electric ranges and washing machines; sketched above is a portion of the plant material flow. General movement is from left to right, with modern, flexible handling equipment overcoming the obstacles of horizontal and vertical distance and making good use of the cubic content of the building. From the porcelain enamel shop in building 1, two trolley chain conveyors move large enameled parts, such as range cubicles and washer tubs, to final assembly lines on floors 4 and 5 of building 2. Painted parts are similarly conveyed from processing in building 2 on the 6th floor to washer assembly on the 4th floor. Finished assemblies from both lines travel on a continuous moving tray elevator to shipping. Conveyors travel at ceiling height, releasing floor space beneath for productive purposes; parts not needed on the line move around the system in "live" storage, reducing floor storage area requirements

Handling Integrates Layout In Existing Building

IT'S NOT easy to feed bulky parts through a multi-story building to assembly lines on upper floors. Further complicating the problem is the need for supplying a large variety of components to stations along the line. Finally, the completed product must travel to the ground floor for shipping. Add to this combination the fact that manufacturing is carried on in two buildings separated by a 60-ft. street, and you have some idea of the difficulties that confronted Landers, Frary, & Clark in their New Britain plant.

Manufactured in the plant are two major items in the "Universal" line of appliances, ranges, and washing machines. Both must sell in a highly competitive market; high-quality, low-cost production is essential. To meet these requirements, management found it necessary to revamp their layout for streamlined production utilizing modern handling methods.

Selected to do the job was Anderson-Nichols & Co., Industrial Engineers of Boston and New York. How well they succeeded is exemplified in the above sketch, outlining the direct movement of parts from processing through assembly to shipping.

A feature of the solution is a system of Link-Belt overhead monorail chain conveyors, timed to take parts from two separate mechanized processing operations on different levels in different buildings, and to deliver them at any point along two separate conveyorized assembly lines located on different floors. Another feature, also engineered by Link-Belt, is a huge tray elevator that solves the problem of vertical flow in a multi-story building by providing continuous automatic movement of the product in either direction to any of five floors or direct to the shipping dock.

Results from these installations are: (1) Material is kept on the move, holding inventory down and saving space. (2) Widely separated areas are tied together. (3) Handling is coordinated with manufacture. (4) Inequalities in the rate of production and use are ironed out. (5) Congestion because of vertical movement is eliminated. (6) From the over-all viewpoint, a greater amount of lower-cost production is obtained from the same amount of space.

Range and washer components that are handled by conveyor fall into 3 groups: enameled, purchased, and painted parts. Processing of enameled parts ends on the first floor of building 1. Purchased parts are held in storerooms on upper levels of the high section of the same building. Processing of painted parts ends on the 6th floor of building 2. From these points material must move in a steady stream to range assembly on the 5th floor and washer assembly on the 4th floor of building 2. Three conveyors do the job. Enameled and purchased parts for ranges are

on one conveyor, and those for washers are on a 2nd; painted parts move on the 3rd unit. Routes for each are outlined in the sketch of the building.

The installations required no major structural changes in the building itself. A check revealed beams of ample size to support loaded conveyors, and ceilings high enough to provide unimpeded working area beneath conveyor guards.

Costly roof alterations were avoided by running both enameled-parts systems through a skylight opening on their way out of the enamel shop. To inclose the conveyors, a tunnel was built from the skylight to the point of entry in the high section of the building.

The range conveyor for enameled parts enters a purchased-parts storeroom on the level of the 5th-floor assembly, and the washing-machine enameled-parts conveyor enters a similar storeroom one floor below. Purchased parts may be added at a dip in the rail, but those received in unit loads are usually moved to assembly by truck.

Moving directly across a bridge into the other building, the conveyor parallels the main assembly line at a high level along an aisle about 15 ft. from the line. Parts are removed at two dips, and to protect the enamel are placed on light pallets resting on roller conveyors that are slightly inclined to deliver material directly to the work station on the line.

At all points on the return loop to the enamel shop, clearances are adequate to permit parts not required in assembly to ride back to a storage area in the enamel shop, or to ride in live storage on the conveyor. With this system, the space allowed for a bank at the line was figured on the basis of a two-hour supply being the maximum.

Painted parts originate in the 6th floor of building 2. They are hung on the third monorail which winds down to the 4th floor and parallels the assembly line on the other side of the aisle from the enameled parts conveyor. Three unloading dips are provided.

Some parts are hung on hooks, others are placed in special carriers designed for small parts that lend themselves to collective gathering. Essentially the carrier is a caster-mounted rectangular frame with removable trays so various size parts may be held. When filled, it is pushed under the chain, and is attached to the chain by means of a special handle and is picked up for movement at the high level. At dips it is only 1.5 in. off the floor and may be released from the chain by the same special handle. It is then pushed to the proper work area along the line by handlers who take all parts off the chain; no production operator leaves the line to get material. The plan is to maintain 4-hr. banks at all operations where these carriers are used. The carrier is a fundamental part of the system and makes it universally applicable to the various types and sizes of small parts that must be handled.

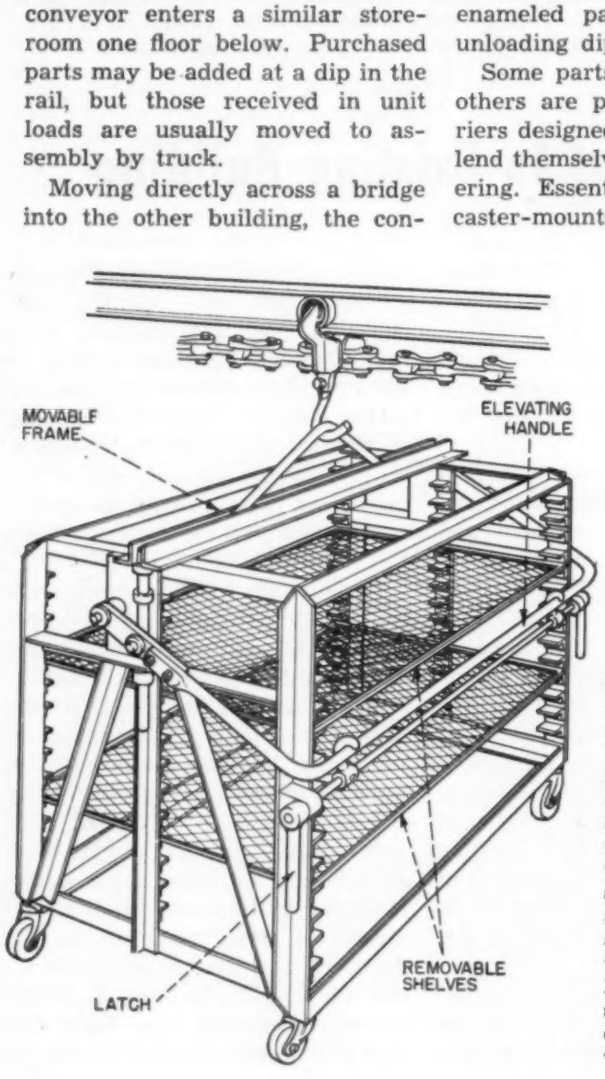
Carriers ride with their widest dimension at right angles to the chain travel to enable a steeper slope on the incline without interference with the chain. Likewise, more carriers per 100 ft. of length may be attached.

Washing machines, crated on the line, roll by gravity to the tray elevator. Loaded on, they move to the 5th floor, over the top, and down the other side of the elevator to the ground floor, where they are automatically discharged either to the loading dock or to the warehouse. They also may be discharged at any floor, and the "up" side of the elevator is used to carry crates and cartons to the assembly floor. Complete flexibility of vertical movement is thus attained.

Assembly of the ranges is similar, but no painted parts are used in this product. Ranges also travel on the tray elevator in a manner similar to that described for the washers.

Both supply conveyors drop to the third floor and return along the aisle in a proposed assembly section on this floor. Designing the system to suit future needs saves a great deal over what it would cost to install a new system later on.

The painted parts conveyor slants back to floor 6. The enamel parts chain rises to the fourth floor bridge and then returns back through the skylight to the enameled shop to complete the circuit.



SPECIAL CARRIER is an essential part of the system. Designed by Link-Belt for handling groups of painted parts as a unit, it has casters so it can be moved on the floor from conveyor to workstation and has a handle-operated movable frame so it can be attached to the conveyor for longer moves. Rack has removable shelves to permit the carrying of parts of various size

TALKING SHOP

Built-Up Seats

FACING RINGS for seats on larger hydraulic valves were formerly difficult forgings; now Chapman Valve is flame-cutting many of them from steel plate at considerable saving in time and cost. . . . Seats were formerly peened into an annular dovetail; now many are made by submerged-arc welding on a bead. The submerged-arc units are built up on scrap radial or upright drills by replacing the spindle with a Unionmelt head and installing a rotatable weld positioner in place of the table. The old drill provides height and position adjustment for the welding head, and the positioner (with its own rotary feed) can be set for suitable welding speed. Units can be adjusted to provide a deposit of proper width and height in one pass . . . Monel seats are still hand-welded; automatic welding does not produce a satisfactory weld . . . Even cast-iron bodies have built-up seats.

Graduation

ADDED to our collection of Metalworking curios recently are two pieces of optical glass, one graduated in 1/100 in., the other a vernier with 13° at 2-in. radius divided into 40 parts. . . . These are products of David Mann, of Lincoln, Mass., who considers precise graduation and threads without play as routine. . . . Such graduating, for astronomical instruments and the like, must be done in a constant-temperature room, may take as much as three days of unattended operation of the graduating machine. . . . Mr. Mann's graduating rooms are underground, to minimize vibration and temperature change, have 3-ft. concrete walls, are held at 68 F. by a tiny gas flame for "base heat," supplemented by a thermostatically controlled electrical coil. . . . Once the machine is started, presence of an operator may generate heat or vibration that ruins the piece, so there's no way of knowing whether all is well until the allotted period has elapsed. . . . The scribing tool is a microscopically accurate diamond, cutting either the piece or just the surface coating for acid etch. . . . The product is far more accurate than usual available checking instruments: to 0.0002 in 36 in. at 70 F. for the inch scale; one micron on a similar millimeter scale.

What Precision?

CIRCULAR MEASURING INSTRUMENTS are frequently claimed "accurate to the thousandth". It's a bit difficult to determine just what is meant, because circular measurements are made in degrees, minutes and seconds. Just for fun, figure out at what radius a thousandth subtends a second of arc. You'll find it to be over 206 in., if our figures are right.

What's more, unless the arc to be measured is very short, a tolerance in the pivot hole of only two-tenths (0.0002 in.) introduces a large angular error because of the resulting eccentricity.

Jewel Standards

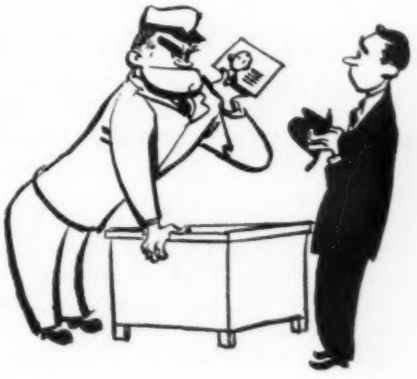
FEDERAL PROCUREMENT BOARD has been stockpiling instrument jewels—even considered stockpiling the synthetic sapphire for them. But there are no standards, so many of the jewels being stockpiled are obsolete types or sizes. The Army-Navy Munitions Board knows this, but instrument manufacturers have not yet been sold the advantages of standardization. There is need here for an immediate job like that done on ball bearings in World War II—after one battleship limped 3000 miles to get a bearing that was aboard all the time, under a different number. It's time industry proved to instrument makers that instruments are repaired—and frequently—so the last war's shortage isn't repeated.

Knowledge Can Hurt

IN CONTRAST to the usual opinion that older and skilled men do best on high-accuracy repetitive jobs, several companies have recently found that young, untrained men may do better. For example, on an internal broach which must be held to 0.002 in. in 30 in., the maker now uses youngsters. They don't know how close the tolerance is, so are not terrified by it. In another shop, producing nothing but high-accuracy parts, all machine operators are youngsters. When they become skilled enough to start thinking their way through the job, accuracy falls.

Playing Soldier

ECHOES of World War II are discernible in some of the plants with special munitions contracts. . . . Some are so busy acting innocent or apologizing for easy-to-explain refusals to talk that they invite pryers who might otherwise fail to notice. . . . One recently requested a "priority" service call from a machine-tool service man, checked his credentials, then blindfolded him for trips to and from his company's machine that was boxed off with tarpaulins to hide the rest of the shop! . . . Another insists upon Government credentials from visitors, supplements this with check-back on filed photos and fingerprints before admission—even if visits are required every day. . . . Like the men who replaced their own badge pictures with Hitler's, we feel such "precautions" smack of little boys playing war. . . . In World War II, the plants who kept their secrets were those who weren't obvious about it.



MATERIALS HANDLING EXPOSITION

SHOW IN PRINT

Products shown in this section have not been described previously in our pages. They will be exhibited at the 4th National Materials Handling Exposition, Convention Hall, Philadelphia, Jan. 10 to 14

Hyster 18,000-lb. Straddle Truck Has New Main Frame, Hoist Clutch

An improved Model M Straddle Truck, announced by Hyster, Portland 8, Oregon, has an 18,000-lb. capacity. It replaces a 12,000-lb. truck, but retains the same size by a revised main frame structure and a new hoist clutch arrangement. Visibility from the driver's seat has been improved by a forward slopping hood.

The new model has a spring suspension system for better riding and steering, which is said to give more traction for the driving wheels and reduce frame stress and tire wear. The truck is powered by a six-cylinder, 82-hp. engine with four forward and four reverse speeds. It can be geared for maximum speeds from 30 to 45 mph. A positive acting automatic stop prevents over-run of the worm-gear driven roller chain mechanism used for hoisting and lowering..... **Booth 428**

Pallets Loaded with Odd Shapes Stack with Elizabeth Attachment

An all-steel pallet with self-contained collapsible stacking attachment will be displayed by Elizabeth Iron Works, Inc., Box 360, Elizabeth B, N. J. The pallets can be loaded with odd-shaped merchandise and then stacked by means of the stacking attachment. The stack capacity is 20,000 lb.

Another new product is the Master Medium Hand Truck Ramp, a 4000-lb. capacity steel ramp for use with industrial trucks to bridge gap existing between railroad car and platform..... **Booth 828**

Handling Devices Pallet Truck Offers Improved Valve Control

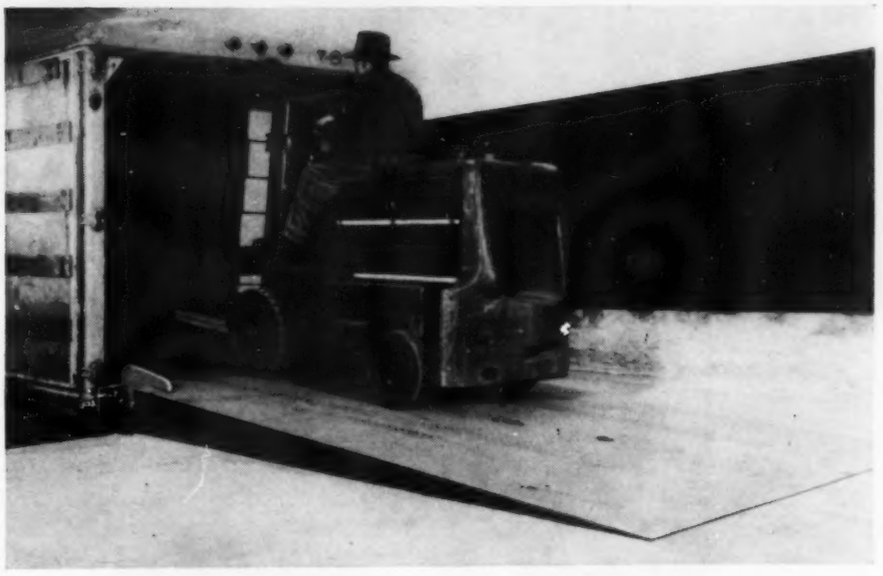
Handling Devices Co., Inc., 581 Boylston St., Boston, Mass., will exhibit the improved Jack-O-Might pallet truck. It is a hydraulic low-lift truck of 2,000 lb. capacity. The improvements are said to include a more positive valve control and stronger return spring. Front wheels have 360° swivel..... **Booth 320**

HEAVY-DUTY CHAIN HOIST which is made of aluminum is produced by Chisholm-Moore Hoist Corporation, Tonawanda, N. Y. The Model M hoist is available in capacities from 1/4 to 10 tons. The one-ton model weighs 35 lb. The hoist operates on sealed ball bearings which require no lubrication.....**Booth 826**

Transitier Gasoline Lift Truck Powered by 26-hp. Cobra Engine

Gasoline-powered fork lift truck in 1000- and 2000-lb. capacity models is produced by Transitier Truck Co., 2477 N. W. 23rd Ave., Portland 10, Oregon. The four-cylinder, water-cooled Cobra engine develops 26 hp. The truck has a welded one-piece body and 61-in. turning radius.

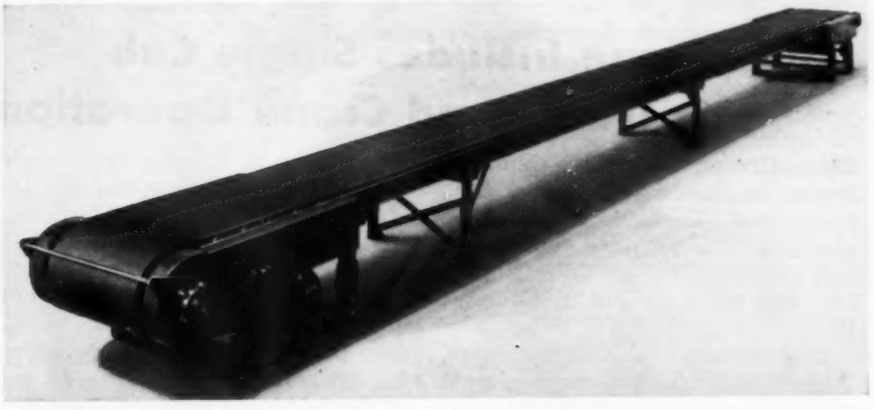
The Hydroflex clutch is located behind and above the engine for easy accessibility. This hydraulic clutch can be adjusted or completely changed in 15 min. Both models are available in 5-, 7-, and 9-ft.-lift sizes.....**Booth 402**



Rotary Lift Co. Hydraulic Device Adjusts Loading Dock to Truck

A hydraulic device for adjusting loading docks to truck bed heights, the "Leva-Dock" is announced by Rotary Lift Co., 1054 Kansas St., Memphis, Tenn. It is a hinged platform supported by a hydraulic jack. With the front of the platform raised, the truck or trailer is backed into position for loading or unloading, and the platform is lowered until the heavy supporting arms rest on the truck floor. The gap between dock and vehicle is bridged by a steel plate, and the hydraulic system is released, so that the front end of the platform is free to travel up or down with the truck bed as truck springs are relieved or compressed.

The ramp has a capacity of 20,000 lb., normally operated by a hydraulic pump unit. It can be operated by 90-psi. air.....**Booth 148**



Rapids-Standard Power Conveyor Built on Standard Roller Conveyor

A power-belt conveyor, "Power-Veyor," built for permanent or semi-permanent installation is announced by the Rapids-Standard Co. Inc., Dept. P-121, 342 Rapistan Building, Grand Rapids 2, Mich. It is available in belt widths of 8, 12, 14, and 20 in. It is said to be suited best to fill the need for a horizontal conveyor with lengths up to 150 feet.

The unit includes a drive section, with motor and drive pulley, intermediate sections of gravity conveyor, and a take-up section. An idler roller to permit return of the belt is built into supports provided for intermediate gravity conveyor sections.....**Booth 112**

Coles Crane Includes Single Cab For Travel and Crane Operation

Coles Cranes, which are built by Steels Engineering Products Ltd., Sunderland, England, will now be available in the United States, and will be distributed by Coles Cranes, Inc., 4312 South Paulina St., Chicago, Ill.

The smallest crane in the range, Model 8506, and a medium-sized crane, Model 8502, will be exhibited at the show.

Model 8506, 1¾-ton mobile crane is powered by a Ford 4-cyl. gasoline engine. The generator has a nominal rating of 3 kw., at 2000 rpm. The hoist motor is 2 hp. at 800 rpm., swing motor ½ hp. at 700 rpm., boom hoist is 2 hp. at 800 rpm., and travel is 3 hp. at 1200 rpm.

Brakes are electro-magnetic, automaticallly applied in hoist, boom hoist, and swing. Hydraulic brakes in the rear wheels are operated by lever or pedal. The crane has a turning circle of 25 ft. and a total weight with 15-ft. gib of approximately 10,000 lb.

The crane has four motions: hoisting, derricking, slewing, and traveling, each operated by separate electric motors. The crane travels on 4 pneumatic wheels, steering being controlled from the driver's seat of the revolving superstructure. The absence of a cab on the chassis gives unobstructed view in all directions from the crane cab. The crane will rotate, or slew, at 2 rpm., and travel at 3 mph., loaded, and 5 mph. unloaded. The power unit is mounted in the superstructure alongside the cab.

Model 8502 is a 7½-ton model, powered by a Ford V-8, 47 hp. gasoline engine. It has a turning circle of 40 ft., and will travel at 2 mph. loaded and four mph., unloaded, on level ground.....**Booth 409**

Island Loop Chain Conveyor Requires No Return Chain

A method of chain conveyor installation which requires no return chain when a loop conveyor is installed, is announced by Island Equipment Corp., 27-01 Bridge Plaza North, Long Island City 1, N.Y. The power unit and a take-up unit can be installed in the conveyor line at the beginning of the operating cycle to obtain the driving power. The method is called the merry-go-round chain unit.....**Booth 207**

Yale & Towne Mfg. Co. to Add Line of Gasoline-Powered Trucks

A line of gasoline-operated trucks, said to be of radical design, will be introduced by the Yale and Towne Mfg. Co., Philadelphia, Pa. The company has previously manufactured only electric trucks. Early models will be available in capacities up to 6,000 lb., and the high-lift types will tier to 130 inches.

Yale and Towne has also developed an electronic hoist, suitable for large plants, that eliminates the necessity of long electric cables and permits several hoists to be electrically controlled from a central point. The controls will be applied to the Cable King line in models up to 12-ton capacity.....**Booth 521**

Hydraulic Equipment Gear Pump Assembled with Only Four Bolts

A hydraulic gear pump in which only four capscrews are required for assembly is announced by Hydraulic Equipment Co., 1100 E. 22nd St., Cleveland 17, Ohio. The assembly bolts are located close to the outside diameters of the gears, and well within the high-pressure area of the pump, so that distortion of the pump

housing, covers, and wear plates is reduced to a minimum. The reduction in the number of assembly screws, and the location of those used, permits the use of larger roller bearings, which is said to increase the life of the pump.....**Booth 731**

Rapids-Standard Platform Truck Has Capacity 2960 to 6000 lb.

A heavy-duty platform truck, The Freighter, is announced by the Rapids-Standard Co. Inc., Dept. F-122, 342 Rapistan Bldg., Grand Rapids 2, Mich. The truck is available in 7 platform sizes, with truck weights varying from 167 to 242 lb.

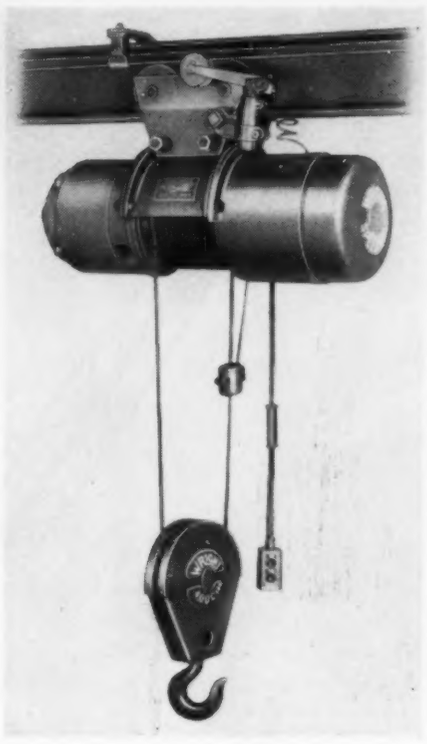
Capacity of the truck depends on the type of wheels and varies from 2960 to 6000 lb. The truck is available in level type or tilt-type models.....**Booth 112**

Wood Pallet for Fork Lift Trucks Can Be Picked Up or Left Behind

A wood pallet for use with four-forked, pusher-type lift trucks has been developed by Wood Pallet Co., Inc., 332 E. 149th St., New York 51, N.Y. Palletized loads can be picked up with the pallet, or the load can be taken without the pallet for shipment, eliminating re-handling of the material.....**Booth 31**

Lift Trucks Electric Tractor Pulls Skids Loaded to 4000 lb.

An electric tractor to pull live and semi-live skids is announced by Lift Trucks, Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio. The Model KTL has a wheel base of 40 in. Two speeds forward, two in reverse, and dynamic brakes are centrally controlled.....**Booth 114**



Wright Electric Hoist Line Includes Pre-Formed Cable

A line of electric hoists in capacities from 1,000 to 20,000 lb. is announced by Wright Hoist Division, American Chain and Cable Co., Inc., York, Pa. The new line is of all-steel construction with pre-formed cable and swaged cable fittings.

The hoists are furnished for lug, hook, plain or geared trolley (mounted either cross-wise or parallel to runway beam), four-parts, single-reeve, close headroom, base mounted, and with motor-driven trolley. They operate on 220 or 440 volt, 3-phase ac.....**Booth 306**

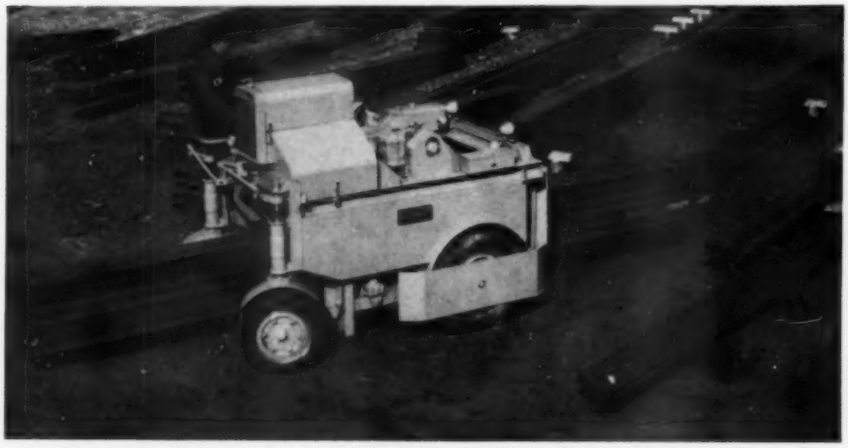
CRANE TRUCK, Type C-4, built by The Elwell-Parker Electric Co., Cleveland 14, Ohio. The crane has a capacity of 3,000 lb. with a 7-ft. radius.....**Booth 615**

WEATHER-TIGHT CAB for driver protection can be installed on Yardlift-40 and Yardlift-60 models of the Clark Equipment Co., Battle Creek, Mich. The cab has a roof window of glare-proof plastic to provide visibility for high tiering.....**Booth 526**

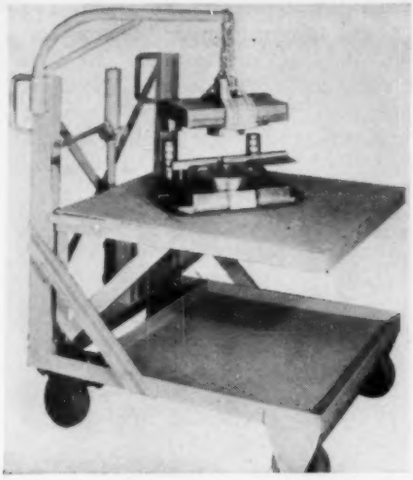
Thew Shovel Co. Wide-Track Crane Travels at Speeds up to 7 mph.

The Wide-Track TL-20 Self-Propelled Crane is announced by the Thew Shovel Co., Lorain, Ohio. This crane has a lifting capacity without outriggers when operating on rubber of 18,000 lb. at a 10 ft. radius.

The crane is powered by a single engine with four forward and four reverse speeds. It is designed for use in industrial yards where loads are heavy and constant travel is necessary. Operated by one man, it travels at speeds up to 7 mph. More than 15 attachments are available. **Booth 423**

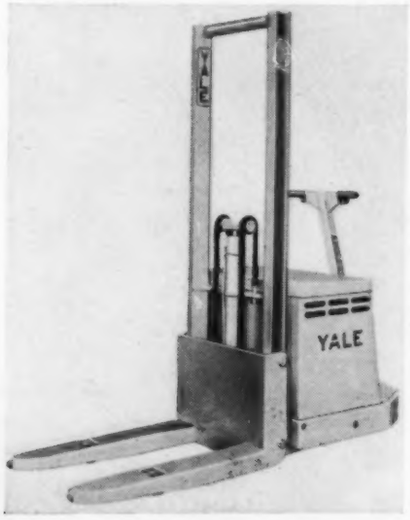


STRADDLE CARRIER, Series 70, built by the Ross Carrier Co., Benton Harbor, Mich., has 10,000 lb. capacity. It is powered by a 6-cylinder gasoline engine rated at 65 hp., at 2800 rpm. Hydraulic hoisting mechanism is provided. Various models will accommodate load heights from 42 to 54 in., and load widths from 40 to 46 in. ..... Booth 617



Wellington Die and Mold Truck Has Hydraulic Table Operation

A hydraulically operated die and mold truck, with a capacity of 1000 lb. is announced by Wellington Machine Co., Wellington, Ohio. Dies can be separated by attaching the removable sling to the upper die and lowering the table. Standard models have a platform 29½x32½ in. with a low position of 24 in. The platform can be raised to 41 in. **Booth 50**



Yale & Towne High-Lift Truck Operates on Low-Capacity Floors

A low-cost, high-lift work saver electric pallet truck is announced by Yale and Towne Mfg. Co., Philadelphia, Pa. It is a battery-operated truck with 2500 lb. capacity. Overall dimensions are 39x31 in. not including the forks. Pallets can be lifted 66 in. for overhead tiering.

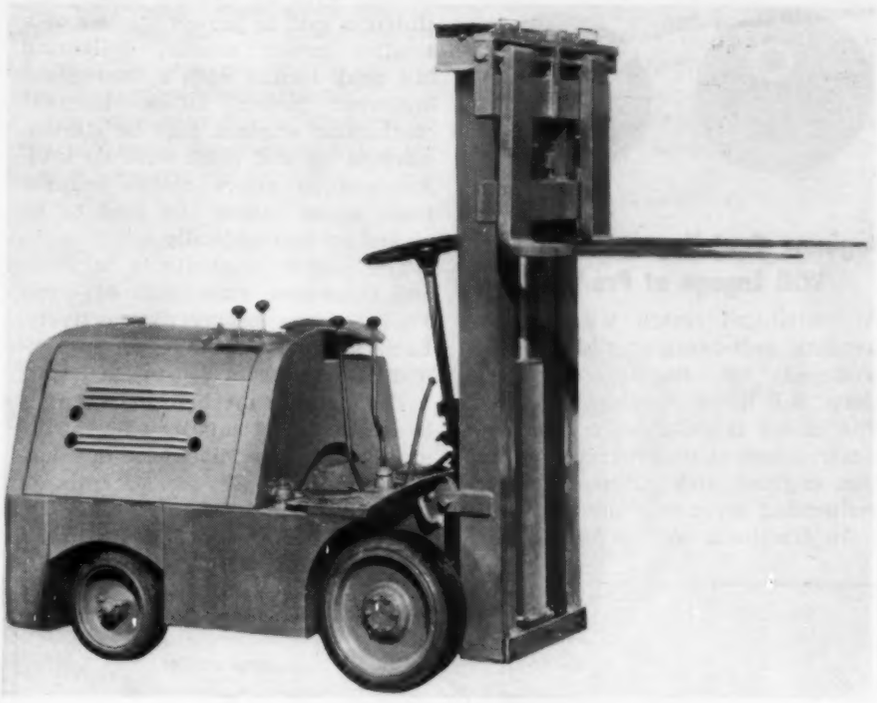
The mast is 83 in. high. Total weight of the truck and battery is 1965 lb. which permits handling loads on floors of low capacity, in elevators, etc. ..... **Booth 521**

Coffing Builds Hoist-Jack To Lift or Pull 2000 lb.

A hoist-jack for various operations which require a hoist, a jack, or a load binder is announced by Coffing Hoist Co., Danville, Ill. The hoist weighs 13 lb., and when equipped with a stand to serve as a hoist-jack the weight is 23 lb. It is built to lift or pull 2000 lb. Operation is by a ratchet and pawl operated by a handle which is designed to bend at maximum overload before the unit can fail. The hoist-jack with 44 in. lift is priced at $39.50.....**Booth 54**

MAGNESIUM DOCK BOARDS are built by Magline, Inc., Inconning, Mich. They are of welded construction and are custom made to fit individual requirements. The magnesium construction makes them about 75 percent lighter in weight than steel dock boards.....**Booth 10**

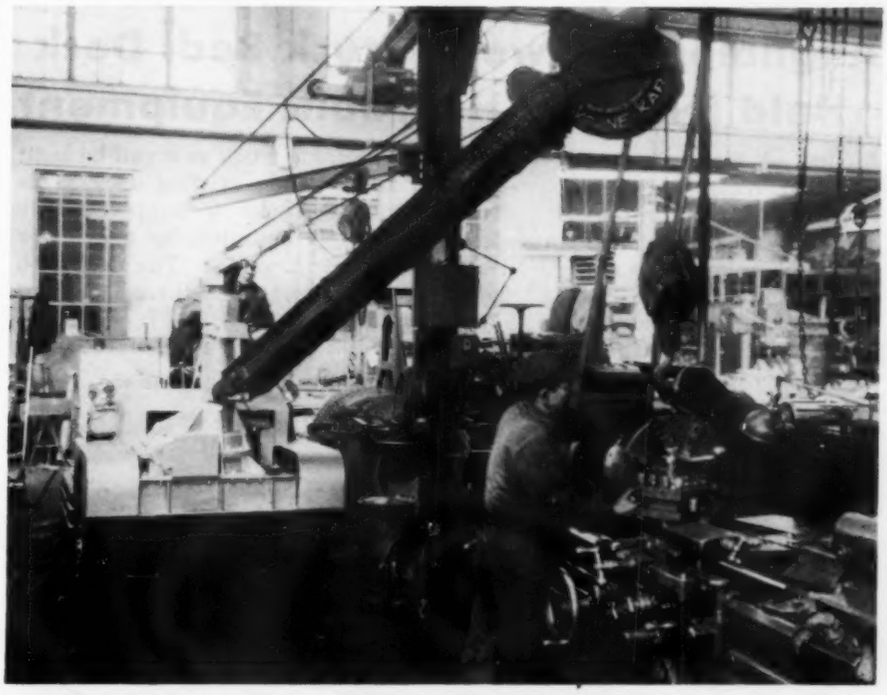
2000-LB. FORK TRUCK for factories and warehouses where floor loading capacity is restricted and aisles are narrow. Built by Baker Industrial Truck Div., Baker-Raulang Co., 2168 W. 25th St., Cleveland 13, Ohio, it has a weight with full load of only 5,805 lb. It will take loads 36 in. long. The truck is said to be low-priced for applications which do not justify the outlay required for a more powerful truck.....**Booth 608**



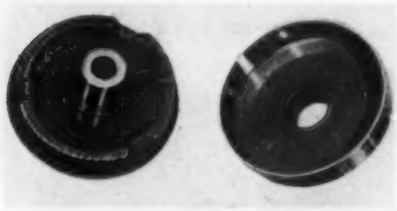
Buda-Hebard Starts Lift-Truck Line

First of series of Fork Lift trucks to be added to the Buda-Hebard line is the Model F-50 Shop Mulift, manufactured by W. F. Hebard & Co., 336 W. 37th St., Chicago 9, Ill. The truck has a 5000-lb. capacity rated at 20 in. from the heel of the forks with a telescoping lift of 110 in.

The truck is powered with an International Harvester U-4 engine with 30.5 bhp. at 1650 rpm. The turning radius is 88 in....**Booth 716**



MOBILE CRANE for operation in extremely close quarters is announced by Silent Hoist & Crane Co., Brooklyn 20, N.Y. The Model AJ crane car has 1½-ton capacity. It is 51 inches wide, 82 in. high, and has an 11 ft. turning radius. It is gasoline-engine powered and is equipped with large wheels for outdoor and indoor use.....**Booth 633**

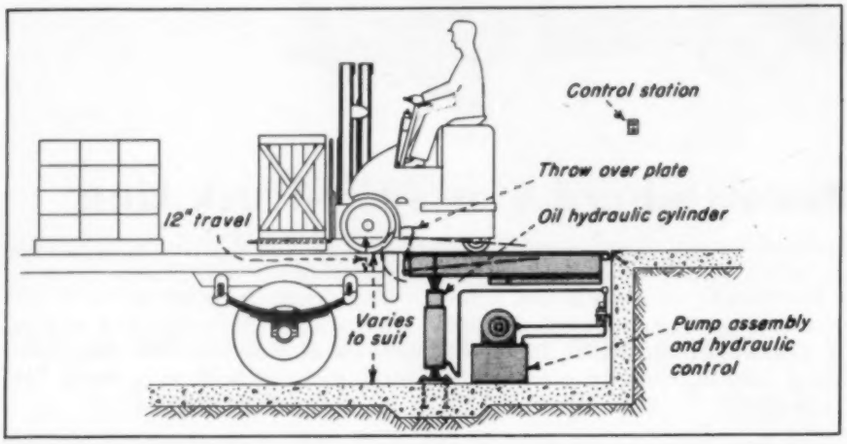


Saginaw Centrifugal Clutch Will Engage at Pre-Set Speed

A centrifugal clutch with an expanding, self-energizing shoe is introduced by Saginaw Products Corp., 8 B River St., Saginaw, Mich. The clutch is suitable for use with electric motors or internal combustion engines, and is especially recommended for small powered units from fractional to 3½ hp. In connection with an electric motor, the clutch is said to permit the use of a smaller power source, delivering full peak torque with a consequent improved power factor. Internal combustion engines may be started, warmed up and idled with no load. Acceleration above clutch engagement speed causes the load to be picked up automatically.

The clutch is available in two-, and three-shoe sizes with 4½- and 5½-in. drum casings respectively. Each size has a range of engagement speeds from 750 to 2200 rpm.

The driving mechanism assembly is said to allow equally efficient operation in either clockwise or counterclockwise directions. Gramix or needle bearings are supplied for shafts.....**Booth 146**



Alignment Between Truck Bed, Dock Held by Rowe Hydraulic Equipment

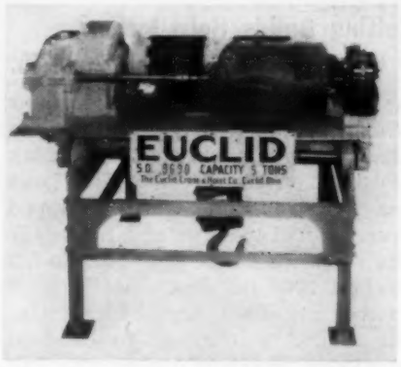
A line of hydraulic equipment to maintain horizontal alignment between a shipping or receiving dock and the trucks or trailers being loaded or unloaded, is announced by Rowe Methods, Inc., 1743 E. 25th St., Cleveland, Ohio. This is accomplished by adjusting the truck to the dock or adjusting the dock to the truck.

Adjust-A Truck No. 1 is built in the runway to the dock and will support and adjust a capacity of 40,000 lb. An electric-hydraulic system operates an 8-in. cylinder which has a standard adjustment of 18 in. The steel deck is constructed of ½-in. steel plate, braced and cross-braced with 10-in. I-beams and a torque tube. The deck will support two-thirds of its capacity on one side.

Adjust-A Dock No. 2 (illustrated) can be built into the dock itself so that a section of dock is adjusted to the incoming truck or it can be built in front of the existing dock. This unit is designed to support 20,000 lb., and is operated by a cylinder with a 12-in. stroke. The deck is 6 ft. wide and has three standard lengths of 5, 6, and 7½ ft. Either of these units permit multiple installation operating from a single motor-pump and reservoir.

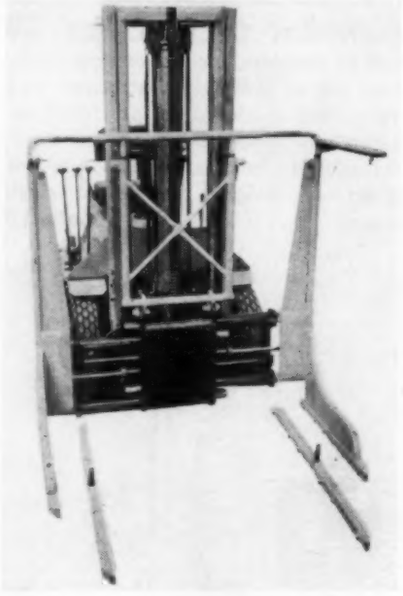
Adjust-A Dock No. 3 is designed for companies with an occasional loading problem. It is similar to the No. 2 unit, but adjustment is made by a hand-lever through a hand-pump.

Adjust-A Dock No. 4 is a completely self-packaged unit with motor, valves, reservoir, pump, and other equipment mounted to the deck. In multiple installations each unit has its own motor and valve system. Installation involves setting the unit in place and pouring concrete to set anchor bolts.....**Booth 404**



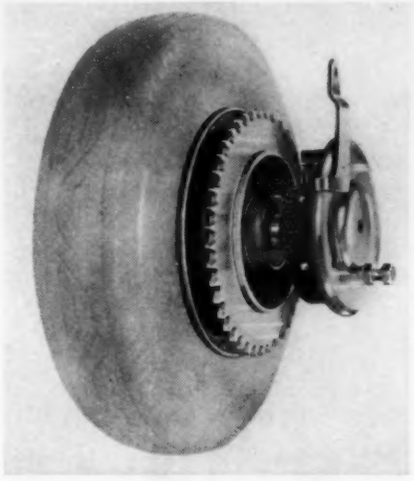
Euclid Overhead Crane Trolley Has Inclosed Gears, 40-ft. Lift

A 5-ton electric overhead crane trolley, exhibited by the Euclid Crane & Hoist Co., Euclid 17, Ohio, has improvements including inclosed gearing, ground shafting, roller bearings and double brakes. With a 12-in. drum and four parts of 7/16-in. cable, it has a lift of 40 ft. at a speed of 40 fpm. Operating on alternating current, it is powered by a 15-hp. hoist motor, and a 2-hp. trolley motor.....**Booth 732**



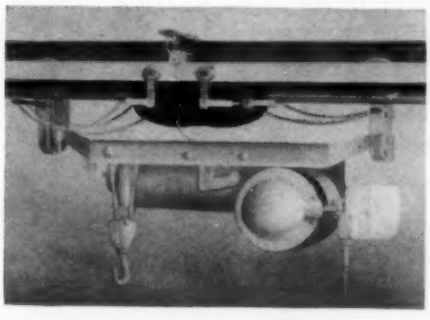
Hyster Co. Box-Clamp Attachment Has Top Stabilizer for Stacking

A box-clamp attachment for use with the Hyster Model 20 lift truck is announced by Hyster Co., Portland 8, Oregon. It is adaptable to the standard hydraulic-controlled Load-Grab, and includes box clamp arms for grasping the load, sliding side support assemblies which may be adjusted to fit boxes of different sizes, and an overhead stabilizer bar to aid stacking. Clamp arms may be 27 or 42 in. long.....**Booth 428**



Saginaw Double-Action Brake Adjusts with Single Wedge

A brake for small motor-driven vehicles with double-action cam operation is announced by Saginaw Products Corp., 8 C River St., Saginaw, Mich. A single capscrew and locknut control internal expanding floating wedge which is the only control necessary for graduated adjustment of brake shoe to drum surface. The 8½ sq. in. of brake-lining area are said to produce ample braking for wheel capacities of 12-, 14-, or 16-in. O.D. ..... **Booth 146**



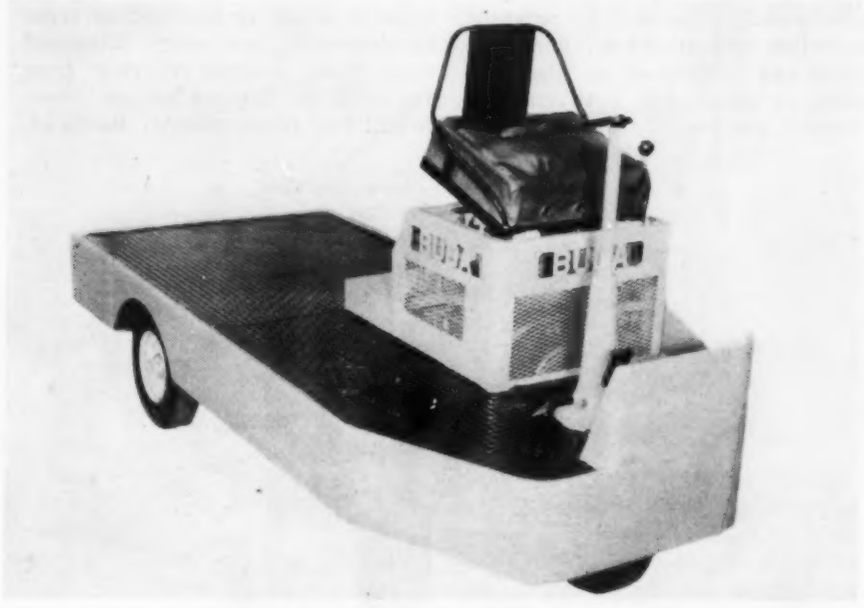
Conductor to Feed Monorail Hoist Cuts Accidental Contact Danger

A method for supplying electric current to monorail hoists which virtually eliminates the danger of accidental contact with the conductor has been developed by Benbow Mfg. Co., Box 589, Redwood City, Calif. Called the Trac Troly System, it operates on the principle of the caterpillar tread on a tractor.

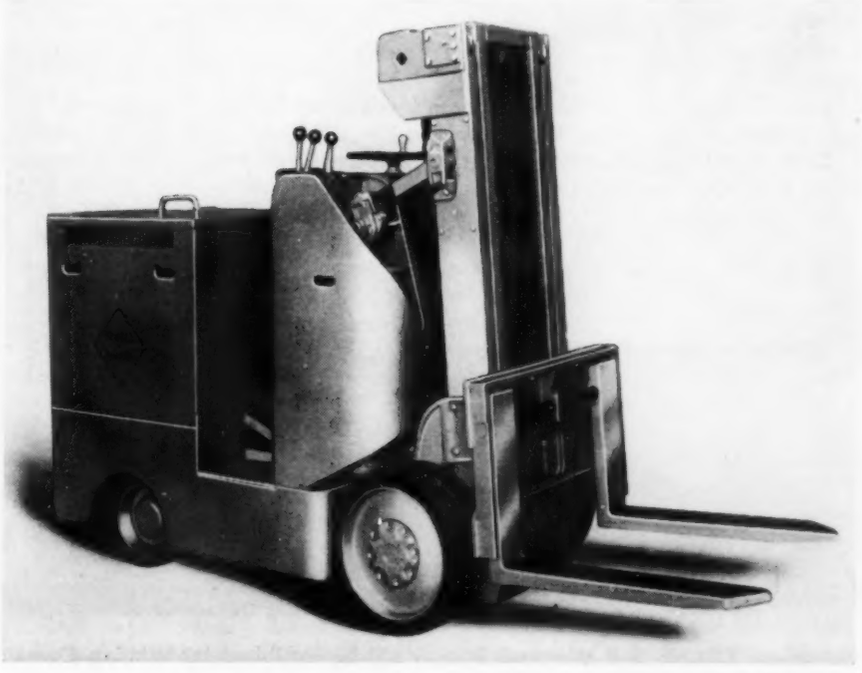
The conductor bar is encased in a rubber sheathing with slotted rectangular openings on the underside. These openings are of such size and shape as to make contact with the conductor difficult. The traveling collector has an endless chain of teeth which make contact with the conductor through the openings in the insulation. Five teeth are in contact with the conductor at all times. The contact is non-rolling, non-sliding, and non-arcing.

The conductor bar is clamped to the bottom of the aluminum I-beam which supports the traveling collector. The conductor can be straight or curved to any specified radii. The minimum radius of curvature for the standard collector is two feet.

Conductors are rated at 225 amp. to 600 volts dc., or 570 ac. Collectors are rated at 150 amp. up to 600 volts dc. or 575 ac. ..... **Booth 17**



MODEL FH platform-type Chore Boy built by the Buda Co., Harvey, Ill., is available in an improved model. The new model has a deck-loading area of 20 sq.ft. In addition to the standard pedal brake, an automatic brake applies itself whenever the operator leaves the seat. Power is supplied by a two-cylinder, air-cooled engine which develops truck speeds up to 12 mph. Width is 40 in. and turning radius 7 ft. ..... **Booth 716**



TELESCOPING FORK-TYPE TRUCK, Type F-19T, built by the Elwell-Parker Electric Co., Cleveland 14, Ohio. This model has a capacity of 6,000 lb. **Booth 615**

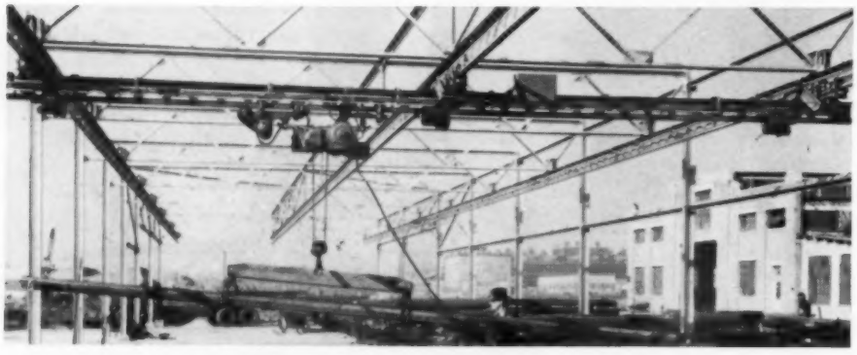
Speedways 45° Flipswitch Turns Over to Connect Spur Line

A conveyor switch for connecting a spur to a conveyor line, the 45° Flipswitch, is announced by Speedways Conveyors, Inc., 1261 Niagara St., Buffalo 13, N.Y. The switch is connected to standard gravity conveyor sections and is operated by rotating the switch section of conveyor. The switch can be placed on standard stands or suspended between two conveyor sections.....**Booth 201**

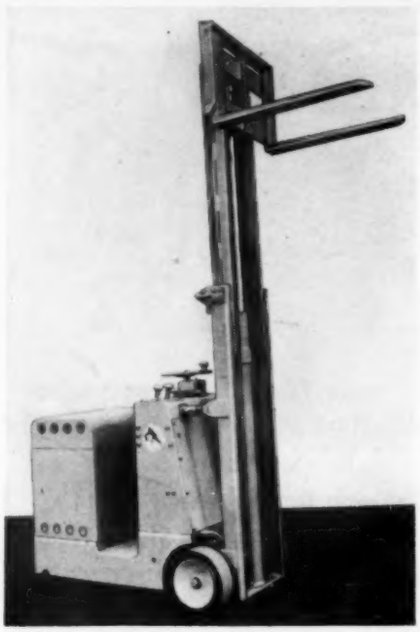
Addison-Semmes Expendable Pallet Custom Made to Load Requirement

Expendable pallets are built by Addison-Semmes Corporation, 1800 Thurston Ave., Racine, Wis., using any combination of corrugated paper board decks glued to round corrugated paper posts. They are made in single or double-face types for four-way fork entry. Standard types have weights varying from 3½ to 15 lb. The pallets are made to suit load requirements..**Booth 611**

4000 LB. FORK TRUCK, which will handle loads to 48 in. long is announced by Baker Industrial Truck Div., Baker-Raulang Co., 2168 W. 25th St., Cleveland 13, Ohio. The truck is of compact design, equipped with no-plug full contactor control with four-speed automatic time-delay acceleration.....**Booth 608**



TRAMBEAM CRANE and Monorail System will be exhibited by Whiting Corp., Harvey, Ill. This system was developed by Spencer and Morris, Inc., Los Angeles, which has been purchased by Whiting. The improved model will be displayed with automatic hoisting, racking and interlocking mechanisms.....**Booth 801**

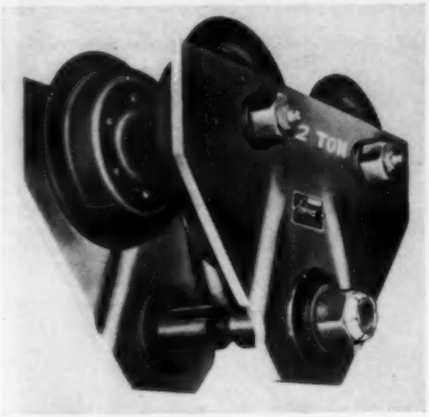


Lewis-Shepard Electric Truck Handles 1500 lb., 48-in. Loads

Electric fork trucks of 1500 lb. capacity are announced by Lewis-Shepard Products, Inc., 272 Walnut St., Watertown 72, Mass. Designed for loads of half to ¾-ton, the truck is available in telescoping and non-telescoping models. The telescoping type has a collapsed height of 83 in., and a lifting height of 125 in.

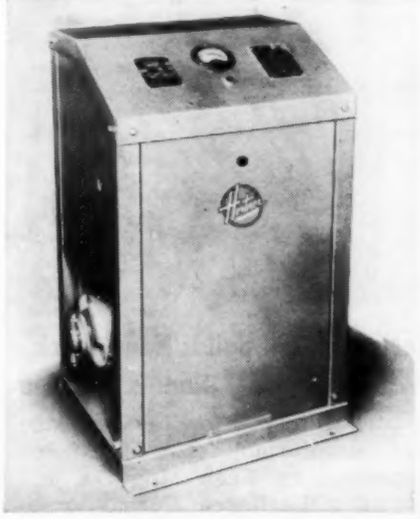
The truck will handle loads 48 in. long. The truck itself is 34 in. wide with "Deadman" brakes which are released by depressing the brake pedal.....**Booth 625**

STEEL CASTERS with rubber-tired wheels in rigid and swivel models are introduced by Industrial Tire and Wheel Co., 109 East Calhoun, Memphis, Tenn. Called the Tuf-Tread casters, they are equipped with a double ball race, pressure grease fittings, roller split sleeve bearings, and are available for light, medium, and heavy-duty requirements.....**Booth 45**



Saginaw Chain-Hoist Trolley Adjusts to 3- to 18-in. I-Beams

An improved chain-hoist trolley for use on I-beam overhead conveyor installations is announced by Saginaw Products Corp., 8 A River St., Saginaw, Mich. Standard grease fittings are supplied for positive pressure gun lubrication. Grease seals hold lubricant and exclude dust and grit. The side plates extend past the wheels to act as bumpers and are self-aligning to distribute the load equally on all four wheels. The trolley is adjustable to mount at any point on the I-beam and can be adjusted for I-beam sizes from 3 to 18 in. ..... **Booth 146**

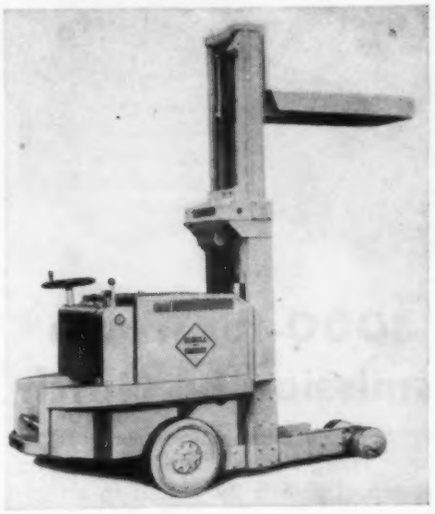


Hertner Single-Circuit Charger Charges Battery in 7 or 8 Hours

An automatic single-circuit, motor-generator battery charger, is being introduced by the Hertner Electric Company, 12690 Elmwood Ave., Cleveland, Ohio. Known as the "Charge-O-Matic" it replaces the Model H. It is a package unit occupying less than 4 sq. ft. of floor space.

The portable unit will charge a lead-acid battery in 8 hrs., a nickel-alkaline battery in 7 hours. All electrical connections, relays and other working parts are mounted on a panel inside the metal cabinet.

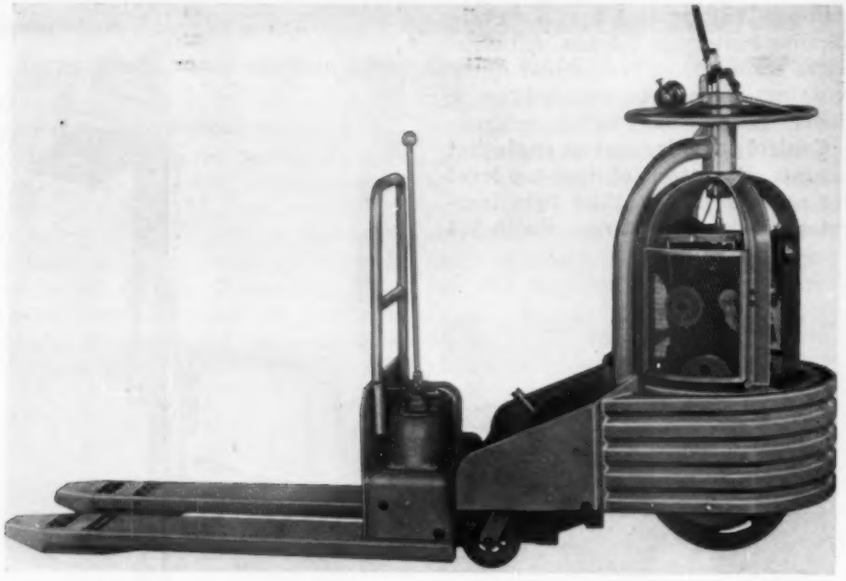
Control panel is set at an angle that mounts all controls at desk-top level for ease of reading. Pilot light indicates when set on charge. . **Booth 224**



TELESCOPING HIGH-LIFT PLATFORM TRUCK, Type ELN-6T, built by The Elwell-Parker Electric Co., Cleveland 14, Ohio. This model has a capacity of 6,000 lb. ..... **Booth 615**

TWIN PUSHER ATTACHMENT for handling metal drums is announced by Automatic Transportation Co., 149 West 87th St., Chicago, Ill. It can be used on standard Skylift electric fork trucks of all capacities. The hydraulic unit contains its own motors and pumps. The attachment can be removed and replaced by standard forks ..... **Booth 524**

HYDRAULIC LIFT TRUCK, Series 5, built by the Ross Carrier Co., Benton Harbor, Mich., has 2½-ton capacity. It is gasoline powered by a four-cylinder, 25 hp. engine. The engine provides three forward and three reverse speeds in either direction with speeds up to 18 mph. It is available in sizes with 6-, 9-, and 12-ft. lift ..... **Booth 617**



Schwitzer-Cummins 3000-lb. Trucks Have No Transmission or Clutch

A line of gasoline-powered trucks with 3000 lb. capacity is produced by Schwitzer-Cummins Co., 1145 E. 22nd St., Indianapolis 7, Ind. Two models are equipped with hydraulic pumps for lifting the load on pallets or skids. A third has a fixed platform, and a fourth type is a tractor towing unit with a draw-bar pull of 260 lb.

Standard platforms are 24 x 48 in. and outside dimensions of pallet forks 27 x 48 in.

The Load Dispatcher line is powered by a Briggs-Stratton single-cylinder gasoline engine rated at 2 hp. There is no transmission or clutch. Drive is by V-belt to an intermediate shaft and final drive is by roller chain to the single drive wheel. Tension on the belt is regulated by an idler pulley which automatically releases when the brake is applied. To reverse direction, the steering wheel is rotated 180° which turns power unit and drive wheel around. Price of the platform models is $515 to $705 F.O.B. .....**Booth 337**

Single-Circuit Battery Charger Can Be Handled by Truck Operator

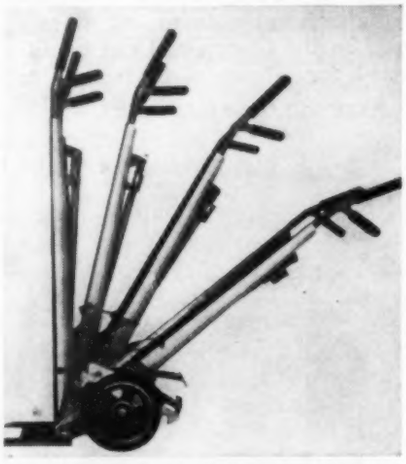
A single-circuit battery charger for on-the-spot charging of batteries for lift trucks is introduced by the Electric Products Co., 1725 Clarkstone Road, Cleveland 12, Ohio. The charger can be handled by the truck operator.

When the charging plug, polarized to prevent error, is connected, and the pointer set, the charging current automatically begins at the proper value. Charging current is controlled at rates prescribed by the battery manufacturer. The charger shuts down when the battery is fully charged. In the event of power failure during charging, the equipment shuts down and will again resume operation when the power is restored. .....**Booth 614**

May-Fran Hinged Steel Belt Built to Handle Hot Forgings

A hinged-type steel belt for handling hot forgings, bolts, nuts, and steel scrap has been developed by May-Fran Engineering, Inc., 1710 Clarkstone Road, Cleveland 12, Ohio. It can also be used as a quench-tank conveyor.

The belt is made of ⅛-in. steel hinges with 4-in. pitch and 3/16-in.-thick steel hinges with 6-in. pitch. The belt can be made up to any length in widths and any multiple of six inches. It can be flexed up or down without opening and will not buckle under hot forgings.....**Booth 628**



Keen Mfg. Co. Builds Hand Truck With Adjustable Handle Position

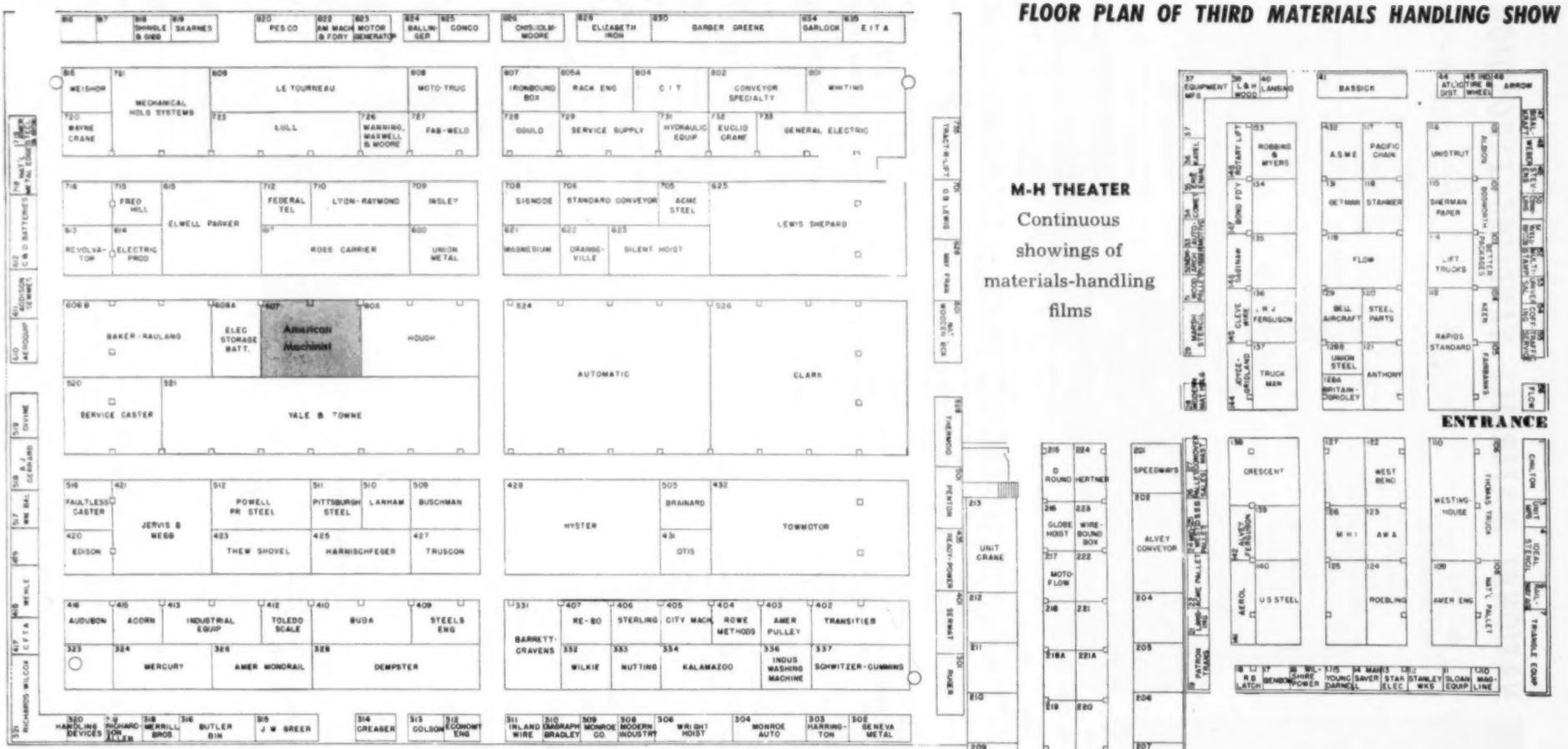
Relationship of handles and toe plate is adjustable on a hand-truck developed by Keen Mfg. Co., 301 Dogwood, Harlingen, Texas. Pressing the pedal releases the mechanism so the handles can be adjusted to the desired angle. If the handles are pushed all the way to the floor, the back end of the toe plate is lifted so that the truck can easily be withdrawn from a load.

To load heavy work the frame is lowered and the truck pushed up to the load. Momentum will slide the toe plate underneath the load. The handles can then be brought up to drop the hook on the load.**Booth 104**

EXHIBITORS AT THIRD NATIONAL MATERIALS HANDLING EXPOSITION

Acme Pallet Co., Inc. New York 7, N. Y. 22
Acme Steel Co. Chicago 8, Ill. 705
Acorn Wire and Iron Works Chicago, Ill. 415
Addison Semmes Corp. Racine, Wis. 611
Aerol Co., Inc. Los Angeles 21, Calif. 141
Aeroquip Corp. Jackson, Mich. 610
Albion Industries, Inc. Albion, Mich. 101
Alvey Conveyor Mfg. Co. St. Louis, Mo. 202
Alvey Ferguson Co. Cincinnati 9, Ohio 142
American Engineering Co. Philadelphia 25, Pa. 109
American Machine & Foundry Co. New York 17, N. Y. 822
American Machinist New York 18, N. Y. 607
American Monorail Co. Cleveland 7, Ohio 326
American Pulley Co. Philadelphia 29, Pa. 403
American Society of Mechanical Engineers, New York 18, N.Y. 112
American Steel and Iron Works Chicago 21, Ill. 719
American Warehousemen's Assn., Chicago 6, Ill. 123
Anthony Co., Streator, Ill. 121
Arrow Co., Inc. Los Angeles 21, Calif. 46
Atlantic Distributors, Inc. Long Island City, N. Y. 44
Audubon Wire Cloth Corp. Philadelphia 34, Pa. 416
Automatic Transportation Co. Chicago 20, Ill. 524
Automotive Industries Philadelphia 39, Pa. 33
Baker Industrial Truck Div. Baker-Raulang Co. Cleveland 13, Ohio 608
William Bal Corp. Newark 5, N. J. 517
Ballinger Associates Philadelphia 7, Pa. 824
Barber-Greene Co. Aurora, Ill. 830
Barrett-Cravens Co. Chicago 23, Ill. 331
Bassick Co. Bridgeport, Conn. 41
Beall Pipe & Tank Portland, Ore. 125B
Bell Aircraft Co. Buffalo 5, N. Y. 129
Benbow Manufacturing Co. Redwood City, Calif. 17
Better Packages, Inc. Shelton, Conn. 103
Bond Foundry & Machine Co. Manheim, Pa. 147
Bosworth Mfg. Co. Cleveland 2, Ohio 102
Brainard Steel Co. Warren, Ohio 505
Buda Co., Harvey, Ill. 410
E. W. Buschman Co. Cincinnati 32, Ohio 509
Butler Bin Co. Waukesha, Wis. 316
C & D Batteries, Inc. Conshohocken, Pa. 612
C.I.T. Corp. New York, N. Y. 804
Caster & Floor Truck Mfrs. Assn., Chicago 2, Ill. 417
Chilton Co., Inc. New York, N. Y. 1
Chisholm-Moore Hoist Corp. Tonawanda, N. Y. 826
City Machine Co. Akron 10, Ohio 405
Clark Equipment Co. Battle Creek, Mich. 526
Cleveland Wire Spring Co. Cleveland 13, Ohio 145
Coffing Hoist Co. Danville, Ill. 54
Coles Cranes, Inc. Chicago, Ill. 409
Colson Equipment & Supply Co. Los Angeles 13, Calif. 313
Comet Mfg. Co. Minneapolis, Minn. 34
Conco Engineering Works Mendota, Ill. 825
Ira L. Conkling Co. Ardmore, Pa. 50
Conover Mast Publications, Inc. New York 17, N. Y. 27
Conveyor Specialty Co., Inc. No. Quincy, Mass. 802
H. W. Creager Mfg. Co. Arrada, Col. 314
Crescent Truck Co. Lebanon, Pa. 138
Darnell Corp. New York 13, N.Y. 15
Dempster Brothers, Inc. Knoxville, Tenn. 328
Diagraph-Bradley Industries, Inc. St. Louis 8, Mo. 310
Divine Brothers Co. Utica, N. Y. 519
Drake, Startzman, Sheahan, Barclay, Inc. New York 7, N. Y. 25
Dri-flo Co. Detroit 9, Mich. 21
Eastern Industries, Inc. New Haven 6, Conn. 11
Economy Engineering Co. Chicago 12, Ill. 312
Thomas A. Edison, Inc. West Orange, N. J. 420
Electric Industrial Truck Assn. Long Island City, N. Y. 835
Electric Products Co. Cleveland 12, Ohio 614
Electric Storage Battery Co. Philadelphia 32, Pa. 608
Elizabeth Iron Works, Inc. Elizabeth, N. J. 828
Elwell-Parker Electric Co. Cleveland 14, Ohio 615
Equipment Manufacturing, Inc. Detroit 5, Mich. 37
Erie Enameling Co. Erie, Pa. 35
Euclid Crane & Hoist Co. Cleveland 17, Ohio 732
Fab-Weld Corp. Philadelphia 34, Pa. 727
Fairbanks Co. New York 3, N. Y. 105
Faultless Caster Corp. Evansville 7, Ind. 516
Federal Telephone and Radio Corp. Clifton, N. J. 712
Harry J. Ferguson Co. Jenkintown, Pa. 136
Fibre Specialty Mfg. Co. Kennett Square, Pa. 127
Flow, Cleveland, Ohio 56
Forker Corp. Cleveland, Ohio 118
Garlock Packing Co. Palmyra, N. Y. 834
General Electric Co. Schenectady, N. Y. 733
Geneva Metal Wheel Co. Geneva, Ohio 302
Gerlinger Carrier Co. Dallas, Ore. 720
A. J. Gerrard & Co. Chicago 1, Ill. 518
Gerrard Steel Strapping Co. Chicago 32, Ill. 140
Getman Bros. South Haven, Mich. 131
Globe Co. Chicago 9, Ill. 135
Globe Hoist Co. Philadelphia 18, Pa. 216
Gould Storage Battery Corp. Trenton, N. J. 728
Great Lakes Steel Corp. Ecorse, Mich. 323
J. W. Greer Co. Cambridge, Mass 315
Gummed Industries Assn. New York, N.Y. 222
Handling Devices, Inc. Boston, Mass. 320
H. G. Hanline Co. Philadelphia, Pa. 419
Harnischfeger Corp. Milwaukee 14, Wis. 425
Harrington Co. Philadelphia 30, Pa. 303
Heppenstall Co. Pittsburgh 1, Pa. 221
Hertner Electric Co. Cleveland 11, Ohio 224
Fred Hill & Son Co. Philadelphia 6, Pa. 715
Frank G. Hough Co. Libertyville, Ill. 606
Hydraulic Equipment Co. Cleveland, Ohio 731
Hyster Co., Portland, Ore. 428
Ideal Stencil Machine Co. Belleville, Ill. 4
Industrial Equipment Co. Chicago 7, Ill. 413
Industrial Tire & Wheel Co., Inc. Memphis, Tenn. 45
Industrial Washing Machine Corp. New Brunswick, N. J. 336
Inland Wire Products Co. Chicago 9, Ill. 311
Insley Mfg. Corp. Indianapolis, Ind. 709
Ironbound Box & Lumber Co. Hillside, N. J. 807
Island Equipment Corp. Long Island City, N. Y. 207
Joyce-Gridland Co. Dayton 3, Ohio 144
Kalamazoo Mfg. Co. Kalamazoo, Mich. 334
Kayel Products Corp. Detroit, Mich. 36
Keen Mfg. Co. Harlingen, Texas 104
Lanham Co. Louisville, Ky. 510
Lansing Co. Lansing, Mich. 40
R. B. Latch Engineering Co. Milmont Park, Pa. 18
Latendorf Conveying Co. Bayonne, N. J. 218A
R. G. LeTourneau, Inc. Longview, Texas 810
G. B. Lewis Co. Watertown, Wis. 701
Lewis-Shepard Products, Inc. Watertown, Mass. 625
Lift Trucks, Inc. Cincinnati, Ohio 114
Lull Mfg. Co. Minneapolis, Minn. 725
Lyon-Raymond Corp. Green, N. Y. 710
McGraw-Hill Publishing Co. New York, N. Y. 607
Magline Inc. Pinconning, Mich. 10
Magnesium Co. of America Chicago, Ill. 621
Manning, Maxwell and Moore Muskegon, Mich. 726
Mansaver Industries, Inc. New Haven, Conn. 14
Marsh Stencil Machine Co. Belleville, Ill. 29
Material Handling Institute Pittsburgh, Pa. 126
May-Fran Engineering, Inc. Cleveland, Ohio 628
Mechanical Handling Systems, Inc. Detroit, Mich. 813
Mercury Manufacturing Co. Chicago 9, Ill. 324
Merrill Brothers Maspeth, N. Y. 318
Moto-Flow Co. Cleveland, Ohio 217
Modern Materials Handling Boston, Mass. 28
Monarch Rubber Co. Hartville, Ohio 32
Monroe Auto Equipment Co. Monroe, Mich. 304
Monroe Co., Inc. Cleveland 6, Ohio 309
Moto-Flow Co. Bay City, Mich. 217
Motor Generator Corp. Troy, Ohio 823
Moto-Truc Co. Cleveland, Ohio 808
Multistamp Co., Inc. Norfolk, Va. 52
National Metal Edge Box Co. Philadelphia, Pa. 718
National Pallet Corp. Pittsburgh, Pa. 108
National Wooden Box Assn. Washington, D. C. 601
New Britain-Gridley Machine Div. New Britain, Conn. 128-A
Nutting Truck & Caster Co. Faribault, Minn. 333
Orangeville Mfg. Co. Orangeville, Pa. 622
Otis Elevator Co. New York, N. Y. 431
Pacific Airmotive Corp. Burbank, Calif. 817
Pacific Chain & Mfg. Co. Portland, Ore. 117
Pallet Sales Corp. New York, N. Y. 26
Paltier Corp. Chicago 4, Ill. 816
Parker Pattern & Foundry Co. Springfield, Ohio 218C
Patron Transmission Co. New York, N. Y. 19
Penton Publishing Co. Cleveland, Ohio 501
Pesco Products Co. Cleveland, Ohio 820
Pittsburgh Steel Products Corp. Pittsburgh, Pa. 511
Powell Pressed Steel Co. Hubbard, Ohio 512
Rack Engineering Co. Pittsburgh, Pa. 805-A
Railway Age New York, N. Y. 6
Rapids-Standard Co., Inc. Grand Rapids, Mich. 112
Ready-Power Co. Detroit, Mich. 435
Re-Bo Mfg. Co., Inc. New York, N. Y. 407
Revolvator Co. North Bergen, N. J. 613
Richardson Allen Corp. New York 11, N. Y. 319
Richards-Wilcox Mfg. Co. Aurora, Ill. 321
Robbins & Myers, Inc. Springfield, Ohio 133
John A. Roebling Sons Co. Trenton, N. J. 124
Ross Carrier Co. Benton Harbor, Mich. 617
Rotary Lift Co. Memphis, Tenn. 148
David Round & Son Cleveland, Ohio 215
Rowe Methods, Inc. Cleveland, Ohio 404
Ruger Equipment Co., Inc. Cleveland, Ohio 301
Saginaw Products Corp. Saginaw, Mich. 146
Schwitzer-Cummins Co. Indianapolis, Ind. 337
Sermat Conveyor Corp. Chicago, Ill. 401
Service Caster & Truck Corp. Albion, Mich. 520
Sherman Paper Products Corp. Newton Upper Falls, Mass. 115
Shingle & Gibb Co. Philadelphia, Pa. 818
Signode Steel Strapping Co. Chicago, Ill. 708
Silent Hoist & Crane Co., Inc. Brooklyn, N. Y. 623
Sisalkraft Co. Chicago, Ill. 47
Skarnes Engineering & Supply Co. Minneapolis, Minn. 819
Speedway Conveyors, Inc. Buffalo, N. Y. 201
Standard Conveyor Co. North St. Paul Minn. 706
Stanley Works New Britain, Conn. 12
Star Electric Motor Co. Bloomfield, N. J. 13

FLOOR PLAN OF THIRD MATERIALS HANDLING SHOW



EXHIBITORS . . . continued

Steel Parts Mfg. Co. Chicago, Ill. 120

Steels Engineering Products, Ltd. Sunderland, England 409

Sterling Bolt Co. Chicago, Ill. 406

Stevens Appliance Truck Co. Augusta, Ga. 49

Thermoid Co. Trenton, N. J. 528

Thew Shovel Co. Lorain, Ohio 423

Thomas Truck & Caster Co. Keokuk, Iowa 106

Toledo Scale Co. Toledo, Ohio 412

Towmotor Corp. Cleveland, Ohio 432

Tract-R-Lift Corp. Chicago 22, Ill. 735

Traffic Service Corp. Chicago, Ill. 55

Transitier Sales Corp. Philadelphia, Pa. 402

Triangle Equipment Co. Nutley, N. J. 7

Truck-Man, Inc. Jackson, Mich. 137

Truscon Steel Co. Youngstown, Ohio 427

Union Metal Mfg. Co. Canton, Ohio 620

Union Steel Products Co. Albion, Mich. 128B

Unistrut Products Co. Chicago, Ill. 116

U. S. Steel Corp. Pittsburgh, Pa. 140

Unit Mfg. Co. Columbus, Ohio 3

Universal 4-Way Pallet Co. Boston, Mass. 53

Vickers Inc. Detroit 32, Mich. 139

Waterman Engineering Co. Evanston, Ill. 419

Wayne Crane Div., American Steel Dredge Co. Fort Wayne, Ind. 716

Wayne Pump Co. Fort Wayne, Ind. 125A

Jervis B. Webb Co. Detroit, Mich. 421

Weber Addressing Machine Co. Mount Prospect, Ill. 48

Wehle Conveyor Co. Binghamton, N. Y. 418

Wellington Machine Co. Wellington, Ohio 51

West Bend Equipment Corp. West Bend, Wis. 122

Westinghouse Electric Corp. Pittsburgh, Pa. 110

Whiting Corp. Harvey, Ill. 801

Wilkie Co. Philadelphia, Pa. 332

Wilshire Power Sweeper Co. Los Angeles 26, Calif. 16

Wirebound Box Manufacturers Assn. Chicago, Ill. 223

L & H Wood Mfg. Co. Farmington, Mich. 39

Wood Pallet Co., Inc. New York, N. Y. 31

Wright Hoist Div., American Chain & Cable Co. Bridgeport, Conn. 306

Yale & Towne Mfg. Co. Philadelphia, Pa. 521

Paul O. Young Co. Philadelphia, Pa. 15

MATERIALS HANDLING CONFERENCE

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

BALLROOM, CONVENTION HALL, PHILADELPHIA, JANUARY 10-14, 1949

MONDAY AFTERNOON •
Prologue Session

Bernard Lester, sales consultant; chairman

2:00 Message of Welcome
Curtis H. Barker, Jr., sales manager, Pallet Loader Div., Lamson Corp.; Conference Chairman

2:15 Outlook for the Industry
Dr. Charles F. Roos, president, The Econometric Institute, Inc.

3:00 Opportunities for Sales Engineering
Ezra W. Clark, business counselor

3:45 The User Talks to the Sales Engineer
T. O. English, assistant general purchasing agent, Aluminum Co. of America

TUESDAY MORNING •
Opportunities for Management

Curtis H. Barker, Jr., chairman

10:00 The Importance of Materials Handling
Address by the chairman

10:30 The Economics of Materials Handling
Stevens H. Hammond, president, Whiting Corp.

11:15 The Materials Handling Engineer
T. L. Carter, materials handling engineer, American Cyanamid Co.

TUESDAY AFTERNOON •
Improvements in Methods

H. B. Maynard, president, Methods Engineering Council, Pittsburgh; chairman

2:00 Modern Methods Engineering and Materials Handling
Address by the chairman

2:15 "Work-Simplification" in Materials Handling
Allen H. Morgensen

3:15 Opportunities for Distribution Economies
Neil Loney, industrial consultant
Discussion: Fred Carpi, vice president, traffic, Pennsylvania Railroad; W. F. White, engineer, Great Southern Trucking Co.; J. W. Milliken, associate editor, *Railway Age*

WEDNESDAY MORNING •
Case Studies in Modern Materials Handling

J. B. McGinn, Div. engineer, materials handling, American Viscose Corp.; chairman

9:30 Efficient Co-ordination of Materials Handling Equipment in a Manufacturing Plant
C. M. Harris, production manager, Electrolux Corp.

10:15 Applications of Methods Engineering and Equipment Design
Donald E. Farr, engineering supervisor, Methods Engineering Council, Pittsburgh

11:00 "Ups and Downs" of Handling in Multi-Story Warehouses
D. O. Haynes, vice president, Merchants Refrigerating Co.

WEDNESDAY AFTERNOON •
Co-ordinating Materials Handling with Related Functions

H. E. Blank, managing editor, *Modern Industry;* chairman

2:00 Panel Discussion
Safety: D. M. Rush, manager, central planning department, Ansco Div., General Aniline & Film Corp.—Industrial Relations: to be announced—Cost Control: Emil Gibian, chief industrial engineer, Thompson Products, Inc.—Lighting: Arthur A. Brainerd, illuminating engineer, Market Studies and Applications Div., Philadelphia Electric Co.—Building Construction: to be announced

THURSDAY MORNING •
Advances in Technique

Jervis B. Webb, president, Jervis B. Webb Co.; chairman

9:30 Automatic Pallet Loading
M. Landon, engineering department, Sun Oil Co.

10:15 Equipment, Layout, Operation, Processing —Solving Application Problems
W. J. Dernberger, superintendent, Materials Handling Engineering, Ford Motor Co.

11:00 Developments in Bulk Handling
E. A. Wendell, sales manager, Link-Belt Co.

THURSDAY AFTERNOON •
Equipment Symposium

J. D. Sheahan, secretary and treasurer, Drake, Startzman, Sheahan, Barclay, Inc.; chairman

2:00 Symposium Discussions
Conveyor Design and Application: R. C. Sollenberger, executive secretary, Conveyor Equipment Manufacturers Assn. Crane, Hoist, and Elevator Design and Application: A. R. Walkley, general sales manager, Shaw-Box Crane and Hoist Div., Manning, Maxwell & Moore, Inc. Industrial Truck Design and Application: Robert Pratt, chief industrial engineer, General Foods Corp.; Lee C. Daniels, chief engineer, Elwell-Parker Electric Co. Marking and Stenciling: H. W. Hempel, vice president, Marsh Stencil Machine Co.

FRIDAY MORNING •
Materials Handling of Tomorrow

John B. Thurston, Wallace Clark & Co.; chairman

9:30 "The Biggest Handling Job in the World"
Col. James Glore, Transportation Corps Board, New York Port of Embarkation

10:15 "Tomorrow" in Air Handling
Parkman Sayward, general sales manager, Slick Airways, Inc.

11:00 Lessons from the Berlin Airlift
U. S. Air Force speaker to be announced

ROUND TABLE

Visitor's Day

"Well, so long, Ed," smiled Al, "I'll be seeing you in the morning."

"What's the big idea?" puzzled Ed. "Where're you headed for, all togged up like a Brooklyn dude?"

"Going over to Hamilton's for the day. Don't take any wooden nickels while I'm gone, Ed."

"Now wait a minute! What's going on over at Hamilton's—come on, Bright Boy, *give*."

"Don't you recall the talk we had some months back about interchange of foremen? You remember, Ed, the idea I spoke to you about—that it might be a good thing if the foremen spent a day now and then in another shop."

"I've heard of schoolteachers going visiting," laughed Ed, "but never a shop foreman."

"What's wrong with a foreman going out for a change of scenery? He can get in a rut as well as any other fellow!"

"What do you know about the other shop?" asked Ed. "And what will the visiting fireman know about this layout? I suppose that's the gag—taking charge of each other's shop."

"Don't make me laugh, Ed; we're not swapping jobs for the day."

"Well, that was the big idea, wasn't it?"

"Of course not. All I do is to be a guest of Harris—that's Hamilton's foreman. He and I will spend the day going over our mutual problems—methods, kinks, and so forth."

"The firm'll go broke spending money that way. What're you going to do about this place? Going to let it run by itself, Al?"

"I'm surprised at you, Ol' Timer! What do you think I have been having Johnson with me for, the last couple of days? I've been breaking him in for this day."

"Well, I hope you know what you're doing, Al—seems sorta silly though to me—visiting another shop dressed up to kill! What next?"

"The next thing is that I'll come back here with a broader mind and, Ed, you can bet your boots that I'll bring back some money-making ideas."

"I'll take a look around while you're gone to make sure that things are on the up and up."

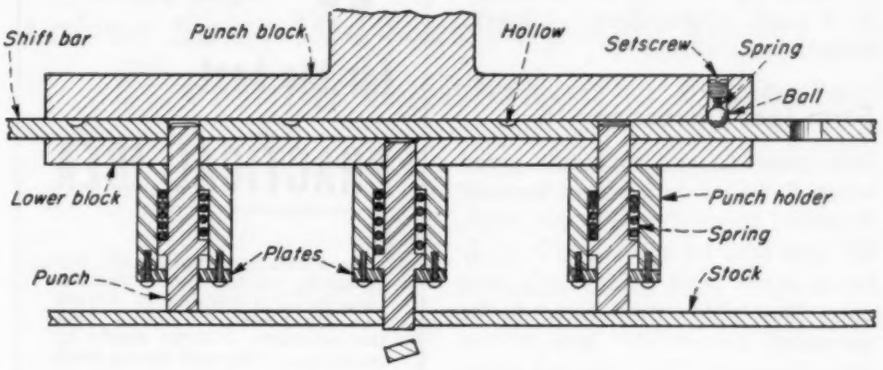
"There'll be no need of that, Ed; I have every confidence in Johnson—I think it is a good idea to get away from the shop awhile so that things would run along—well, if I were bumped off suddenly."

"That's crossing the bridge before you come to it. You have troubles enough without digging that possibility up. And what if they find Johnson can take over?"

"In one day? Besides, if he can, they'll darn soon put him in anyhow. I feel that I am doing a good job of being a foreman here if I can step out and a man that I've trained can carry on. How else can I get ahead?"

***SHOULD A FOREMAN** "go visiting" occasionally on company time? Can he help his employer, or does he help only himself? Your ideas and opinions on this subject will help others. Discussions of earlier topics appear on later pages.*

Practical Ideas



Shift Bar Controls Action Of Floating Punches

EQUIPPED WITH a series of floating punches and a shift bar, a hole-punching die can do the work of a number of dies and setup time for various spacings can be reduced to a few seconds. Die blocks are standard, but the punches and holders are made with the variations illustrated.

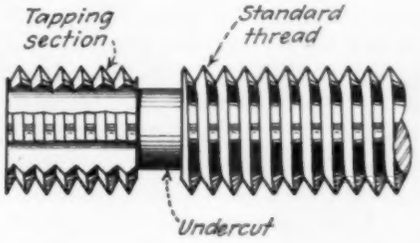
The punches can be mounted on a punch block of common size, but some changes are necessary from normal practice. A shift bar is inserted between the block proper and a lower block. The lower block carries a number of punch holders and is pierced at each punch. The shift bar, however, is built special for a number of specific jobs. Holes are drilled through it to clear the punches, as they contact the stock, in locations where holes are not wanted to be punched. The points where punches are located but the shift bar is not pierced for punch clearance will be punched through in the stock.

Indexing is controlled through hollows ground in the top of the shift bar at proper locations. A spring-loaded ball, backed in a tapped hole by a setscrew (for best adjustment) slips into each hollow and stops the bar. Shifting is best handled through a lever linkage that will bring the control handle to the front of the die.

Each punch is spring loaded from inside the holder. The spring behind each punch will be compressed as the end of the punch hits the stock and the punch is forced back into the clearance hole in the shift bar. The springs do not act when the punch is backed by a solid section of the shift bar and the punch knocks out a slug.

The lower block is bolted to the main punch block, and the shift is fitted in a slot in either block or both. This slot will run parallel to the stock. Punches are retained by plates screwed to the holders.

The punches are made to fit closely in the holders, with about 0.00015-in. clearance. Both punches and holders can be made of high-carbon steel to reduce wear, and lapping may be necessary to insure smooth action. *Lowell F. Stull, Youngstown, Ohio.*

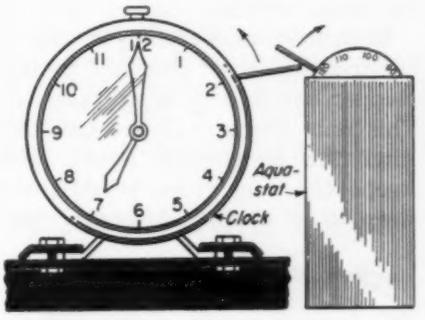


Tapping Stud Cleans Holes

OCCASIONALLY threading jobs involve driving a stud into a worn or distorted tapped hole. In such cases, I make a special stud, with about an inch of tapping section cut integral with the regular thread, on the lower end.

The end thread, cut about 0.003 oversize, is separated from the regular thread body with an undercut. After the hole has been cleaned by the tap, the bottom portion can be knocked off, and the remaining stud driven into position.

The tapping section is ground for clearance and case hardened before the operation. Care must be taken so the tapping section does not get caught in the hole and break off. *W. G. McKay, Carberry, Manitoba.*

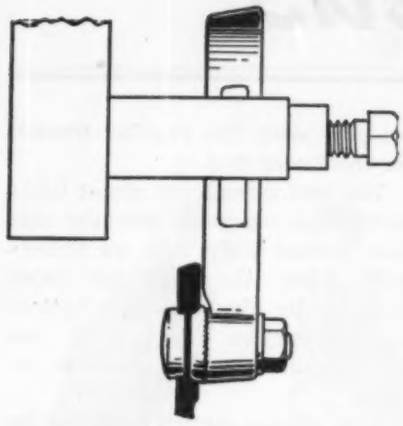


Alarm Clock Starts Plating-Tank Heat

HERE is an idea that I suggested to a friend who runs a plating shop. He starts up his plant at 8 in the morning, but wanted his tanks hot by that time so he would lose no time in getting operations started.

The tanks are heated by steam, generated by an oil burner. The regular aquastat control was hooked up to an alarm clock as illustrated. Set for 7 a.m., the clock goes off and rotates a short wire soldered to the alarm-winding key. This contacts a wire connected to the aquastat, which is moved into operating position.

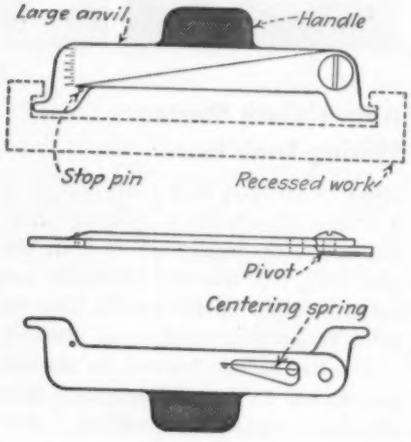
The clock was clamped down on a bracket next to the 'stat in such a position that the bracket would stop the wire, and the alarm key, when both had rotated about 180°. *Bernard Levowich, Brookline, Mass.*



Reversed Shaper Tool Doesn't Dig In

STRAIGHT TOOLBITS can be reversed in the shaper holder to eliminate the digging-in effect mentioned by George Wilson in a recent Practical Ideas article.

With the tool reversed, the planing-tool holder is clamped in the clapper box in a reversed position. This puts the axis of the tool behind the supporting points and keeps the tool from cutting too deep. *S. B. Richey, Phoenix, Ariz.*



Light Gage Checks Recess

SOME TIME AGO I had difficulty in measuring the inside of a recess. Neither standard calipers nor an inside micrometer would do the job, so I made the illustrated tool, which did. The offset anvils of the gage fitted in under the ledge.

Flat stock formed the two anvils, with large metal screw acting as a pivot. The larger anvil was milled out in back to expose space for a pin that was attached to a piece of clock spring. This held the gage on a zero mark with a light pressure. With the long arm, the gage gave accurate readings in a ratio of 4½ to 1. *John T. Holmquist, Chicago, Ill.*

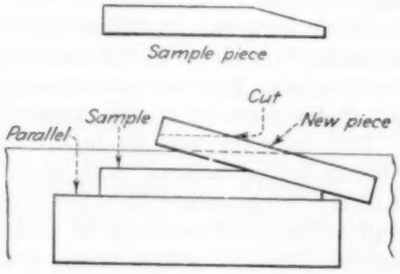
Form-Tool Discussion

THE FORMULA and constants given by D. E. Sweet in a recent issue of Practical Ideas should prove helpful, and may be applied to components other than pulleys. In this case, the tables may have to be extended beyond 26° and 37° in both directions. The author's equation for the constant K can be simplified into:

$$K = \text{Sec.}\frac{\phi}{2} - \tan\frac{\phi}{2}$$

This formula will require less work to find other values.

One correction should be made to the table given. The value of K for 37 should be 0.7199, not 0.7262. *Carl A. Johnson, Springfield, Mass.*



Old Shape Sets Up New Block For Shaping Job

RECENTLY one our apprentices had to reproduce the sample part illustrated. With a little advice from an experienced machinist, he was able to do it in a shaper without making any special measurements to find the slope of the inclined flat.

The sample was laid on parallel blocks in the shaper vise and the new part, after being shaped to the rectangular dimensions, was placed on top of it. A piece of paper was inserted between the vise jaw and the new part to insure a good grip on the work. *Gustave Remacle, Union, N. J.*

$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—**$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.**

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

67TH WINNER:

Allan B. Nixon

Radius Cutter

NEWS OF METALWORKING

Labor Sees 1949 as Pay-Off Year; Sweeping Legislation is Expected

WASHINGTON — The country's union leaders look for 1949 to be the pay-off year.

They expect next year to get a softening or elimination of much of the labor-regulatory legislation that came out of Congress and state legislatures last year.

They also hope to make some forward strides through improvement of the wage-hour and social security laws, and possible enactment of new social laws, such as compulsory health insurance. They expect this from the Democratic Congress that labor's all-out drive helped elect and from friendlier governors and state legislatures.

From the Democratic national administration, which the combined labor and farm vote kept in the White House, the union leaders look for assistance in winning a fourth round of postwar wage increases.

This is the outlook for 1949 in matters concerning labor:

Taft-Hartley Law—It will include the Wagner Act and some of the 1947 Taft-Hartley amendments. There will be some protection of the AFL craft unions, control over jurisdictional disputes and some secondary boycotts and some plan for coping with national emergency disputes, such as a coal or transportation strike.

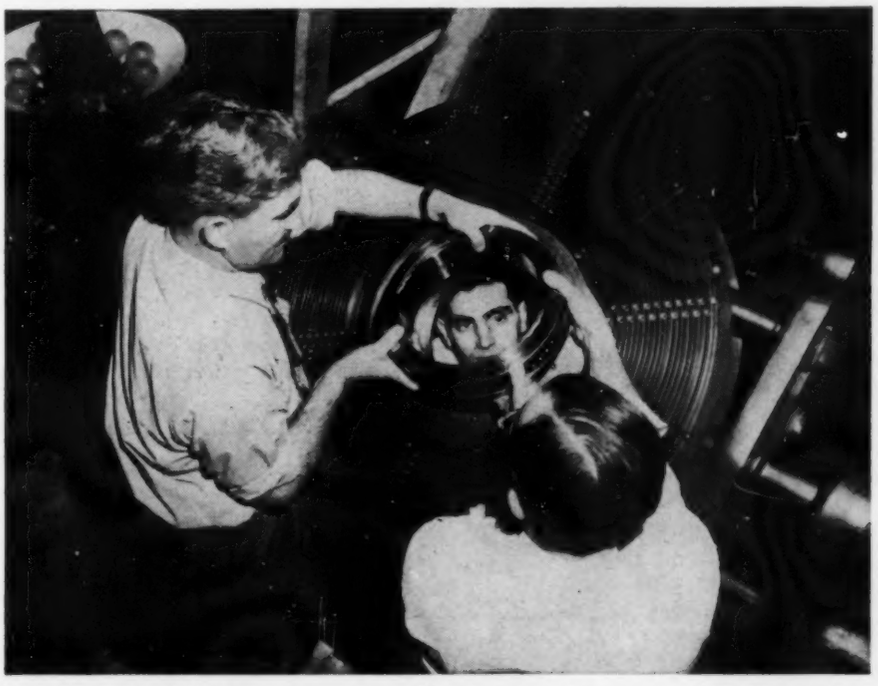
Fourth-round wage increases—with the cost-of-living leveling off, unions will attack profits as the basis for higher wages. There will be new increases clustered from 5 to 10 cents an hour and further gains will be made in welfare benefits. But there won't be a general pattern. Individual employers may get off without any wage boost, particularly in fields where layoffs are occurring or where higher wages will force layoffs.

Closed shop—its legality will be restored by a new federal labor law. The ban on all forms of compulsory union membership may be dropped by some of the dozen states which now have it.

Social security—chances are benefits will increase and coverage expanded.

Health insurance—compulsory federal health insurance will get serious consideration from the 81st Congress, but chances of putting it into law next year are not good.

Wage-hour law — the minimum wage is likely to be pushed up from 40 to 65 or 75 cents an hour. Labor Secretary Tobin and Wage-Hour Administrator McComb also hope to change law so as to eliminate "overtime on overtime."



***STAR OF BETHLEHEM** appeared on the domed ceiling of the Fels Planetarium in Philadelphia at Christmas because SKF Industries rushed through on top-priority basis a bearing to replace the worn out German one in 10 days. Here workmen are shown replacing the bearing*

74 Years on Job

COATESVILLE, PA.—Charles Lukens Huston, first vice president of Lukens Steel Co., now 93 years old, began on Dec. 15 his 74th year of continuous service with the concern.

A grandson of Dr. Charles and Rebecca Lukens, for whom the company is named, Mr. Huston walks to his office daily from his nearby home. He started work as a clerk and bookkeeper in 1885.

New Britain Buys Lucas Machine Co.

CLEVELAND—New Britain Machine Co., New Britain, Conn., has acquired the plant, assets and good will of the Lucas Machine Tool Co., Cleveland. Operations of Lucas will be continued in Cleveland as a division of the new owning company.

The acquisition adds the manufacture of horizontal boring machines to New Britain's line of automatic screw machines, chucking and boring machines.

H. N. Stephan will remain as vice president and general manager.

Robert Morse, Jr., Diesel Unit Head

CHICAGO—Robert H. Morse, Jr., vice president in charge of all operations, Fairbanks, Morse & Co., was elected president and treasurer of the Diesel Engine Manufacturers Association at the annual meeting Dec. 8.

Vice presidents named were: George W. Cordrington, vice president, National Supply Co., and O. H. Fischer, president of the Union Diesel Engine Co. Harvey T. Hill was reappointed executive director of the Association for the fifth time.

***JAMES E. GLEASON,** (left), chairman of the board of the Gleason Works, is shown on his 80th birthday with his son, E. Blakeney Gleason, president of the concern*

***MR. GLEASON** (right) is presented a barometer by William B. Richter, president of the Twenty-Five Year Club, at the birthday party Nov. 24th*

***ALMOST 10,000** visited the Gleason Works plant during the celebration of Mr. Gleason's birthday. Visitors included friends and families of employees*

James Gleason Marks Birthday

James E. Gleason, chairman of the board of the Gleason Works, Rochester, N. Y., was honored on his eightieth birthday by his friends, business associates, employees of his company, and civic and educational leaders in ceremonies Nov. 24 presided over by his son, E. Blakeney Gleason, company president.

He was presented with four volumes of letters from friends in all parts of the world congratulating him on his birthday. He also received a book signed by everyone associated with the Gleason Works, and a pendant-type barometer from the Twenty-Five Year Club. Lloyd D. McDonald, president National Machine Tool Builders' Association, and Tell Berna, general manager, extended Mr. Gleason the best wishes of the NMTBA. Nearly 10,000 visited the plant during the evening.

Steel Allocations to Continue

WASHINGTON—The real threat of mandatory controls over steel is back again. Four months ago the steel producers reached what they hoped was the peak in steel set-asides for various "political" allocations programs. They were allocating about 10% of total finished steel to "essential" domestic claimants under the voluntary allocations program set up by the Taft Act. Another 1.8% was being exported to ECA countries and an additional 5.6% to non-ECA countries.

Steel producers planned to cut back the domestic set-asides when the Taft Act provisions expires Feb. 28. They announced at that time they would extend voluntary allocations beyond that date only to military claimants. Exports, of course, would continue.

Now, the programs already in effect will continue for another six months after March 1. The six-month extension was written into the act but had to be sanctioned by all concerned. There are some new people coming into the act, too.

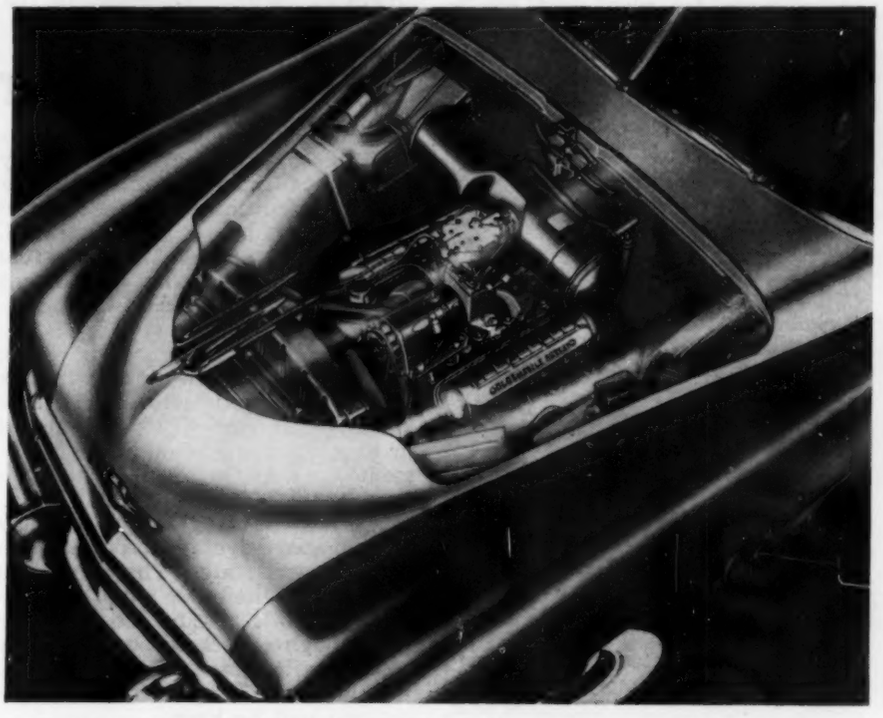
Agreements already have been reached whereby more than 12% of total finished steel production will be allocated to domestic claimants and more are to be announced shortly. To top this off, ECA exports next year probably will be doubled.

Detroit

OPTIMISM BLENDED WITH PESSIMISM IN AUTO INDUSTRY...OLDS, PONTIAC REPORT STRONG DEMAND...PRICE REDUCTIONS HINTED

The strange blend of optimism and pessimism hovering over the automobile market is of continuing interest in Detroit. No automobile company professes anything except the firm conviction that its cars will continue to sell at rates limited only by availability yet some are selling from hand to mouth today, and observations are being heard that when few soft spots appear, they disturb the entire tight fabric of the market.

It is said to work like this: scattered makes have to begin to find customers. One means is to increase trade-in allowances. This creates competitive offers. Pretty soon the eagerness of the prospective buyer to get delivery is considerably reduced. Particularly is this latter outcome a fact with used car prices slumping as they are; new car sales are no longer being made to many buyers who formerly used their places on customers' lists simply to get possession of a commodity which would produce them a profit on the second hand lot around the corner.



***TRANSPARENT PLASTIC HOOD** is used to show off the new high-compression 8-cylinder engine in Oldsmobile's line of 1949. Hood, which is identical to standard steel one, eliminates hood raising in show rooms which tends to break the smooth lines of the Futuramic*

Optimistic Side

Thus goes the pessimistic side. The optimistic side is evidenced by the statistics of the majority of companies. Typical are those of Olds and Pontiac, two producers now concerned with their 1949 models. Olds reported no less than 1,000,000 unfilled orders on hand as of the end of December. Pontiac reported 700,000 and estimated that 60% of these were "good."

The Olds panorama is so broad that plans are being completed at Lansing to double the capacity of the new rocket engine plant, now building 28 powerplants an hour on two shifts, and set up for 30. The same kind of equipment—largely of the transfer type—will be used in the expanded program; no basic changes are seen necessary on the basis of experience thus far. Up to now, around $10-million has been spent to tool this facility; new equipment will merely facilitate that on hand, rounding out the bottleneck sections. Nevertheless, another couple of million in machines will probably be ordered, with a target date of late next year for completion of the program. No new construction will be required, incidentally.

Buick, too, has some expansion plans. It will triple the output of its dynaflow transmission by next March. Current output is at a rate of 450 units a day; any tripling would indicate about 90 pct. installation in 1949 model Buicks. Primarily any such expansion would be reflected in increased facilities for the ticklish castings which comprise the "innards" of the mechanism, rather than new gear-making machinery.

Wooden Bodies Going

Die makers are watching with interest the gradual shift from wooden to steel station wagons. One substantial producer in this field has the idea that by 1950 or so the wooden station wagon will be about as outmoded as the buggy. "There's no need whatsoever for a wooden wagon," this company states. "We are making both types and will shortly quit making the wooden ones altogether."

Station wagon business, to be sure, is in the doldrums. That particular postwar rose has lost its blush, and deliveries can be obtained almost anywhere, on almost any make. It may be added that the same is true for most convertibles.

Of major interest in analyzing today's state of automotive affairs is the price structure. The steep climb of quotations has been definitely slowing down, although it is still going on. It has decelerated to the point where a few people are wondering where the first lightning of price reductions will strike—lightning which will create a heavy publicity payoff almost immediately.

Price Cut Rumored

One thesis has been expressed that Kaiser-Frazer Corp. may make this against-the-tide move. The reason: K-F is believed to have pretty well amortized its die costs by now. Eliminating the factor is responsible for a lot of the steam in the price climb. Not only that, but K-F prices are just about competitive today—they were well out of line a year or more ago, but other makes have raised enough to close up the gap. Accordingly, K-F could put itself in splendid comparative position with a price cut which would not be too expensive to absorb. There's nothing official on this; it is simply curbstone conversation in Detroit which seems to have a fair amount of innate merit.

The Chrysler Silver anniversary models, meanwhile, are now the subject of more gossip: delays in their announcement from February to as late as April are being buzzed about. The story is that the new Plymouths will also be delayed. Presumably the reason would be a continuing unsettlement in final design plans, because there is ample tooling capacity now available in Detroit shops and elsewhere.

Capital Spending Will Continue In 1949, Economist Tells MAPI

WASHINGTON—Currently planned expenditures for plant and equipment for 1949 will be only slightly less—if any—than 1948's record $19 billion, Dexter M. Keezer, director of the Economics Department of McGraw-Hill, told the fourth annual conference of the Machinery and Allied Products Institute Dec. 10-11 at the Mayflower Hotel.

Discussing a preliminary report on a survey of capital spending, Mr. Keezer said that it was plausible to estimate that, even with $19 billion more being spent in 1949, the nation was still about $100 billion behind catching up on what was lost during the years of depression.

Dr. Corwin Edwards, chief economist for the Federal Trade Commission, explaining his agency's policy on pricing, assured the more than 200 businessmen attending the session, that the FTC was interested primarily in assuring competition—not in prohibiting freight absorption. Uniform pricing, he admitted, does not necessarily mean collusion; FTC sometimes even attacks price-cutting where it is used for monopolistic purposes. Generally, Dr. Edwards said, the Supreme Court decision banning the basing-point system in the cement industry has been given more significance than it deserves.

Attorney Agrees

Mark S. Massel, an attorney with Bell, Boyd & Marshall of Chicago, agreed with this last statement. In addition, he charged that the basing-point issue has been confused by the absence of specific rules and regulations. As a result of the Supreme Court decision, for example, a firm can be prosecuted if its delivered prices are equal to its competitors; under the Robinson-Patman Act, however, that same firm may be breaking the law if its prices are not equal.

The organization and accomplishments to date of the Anglo-American Council on Productivity were described by W. Duane Evans, chief of the Office of Labor Economics, Department of Labor. Mr. Evans, who is a consultant to this Marshall Plan subsidiary, reported that several hundred British management-worker teams are scheduled to visit the United States for two-month periods to study production methods.

Dr. George Terborgh, MAPI research director, estimated that it would take this country 17 years to catch up with its basic needs, if the current rate of spending for capital goods is maintained.

Government capital outlays—for roads and dams—have already been postponed because of defense and foreign aid commitments, said Dr. Edwin G. Nourse, chairman of the President's Council of Economic Advisors. If the military budget for fiscal 1950 exceeds $15 billion, he warned, these projects may have to be put off indefinitely. Higher taxes, deficit financing and/or controls might also be necessary. However, the administration would like to keep the budget balanced.

Active Machine Tool Demand Seen

NEW YORK—There will be an active demand for machine tools by progressive manufacturers for the purpose of cutting costs and improving quality, states Robert L. Giebel, president American Machine Tool Distributors' Association, as a result of a canvassing of association members from coast to coast.

"While the total number of active buyers may be fewer, the volume will be quite satisfactory," Mr. Giebel said. "Buyers will be interested in expensive special-purpose equipment or very high-grade standard machines.

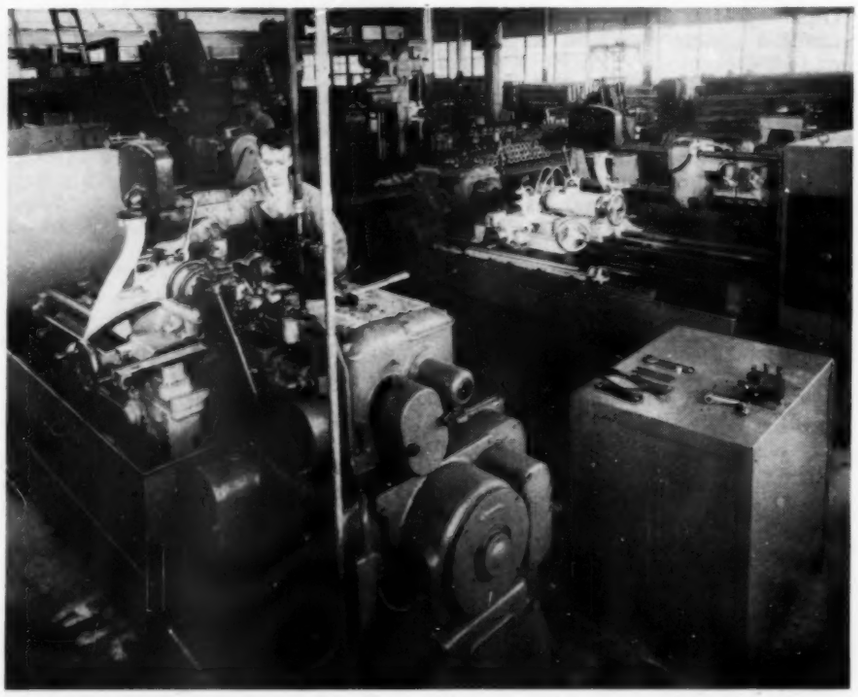
"Certain sections of the country will be above average, especially the north central states. The South and far west, on the other hand, may experience quite a lull. The East may get enough orders to be the happy medium. Real creative salesmanship will be needed everywhere, as competition will be keen.

"Intensive studies are being made by many manufacturers to determine if and where the installation of new machine tools will increase manhour output to offset the increase in hourly rates. These studies may produce some machine tool business in the near future."

Mr. Giebel pointed out that machine tools in general do not become less efficient with age and that they retain their built-in value for many years and there depreciation is accelerated only because of the increased productivity of similar tools of a more modern design.

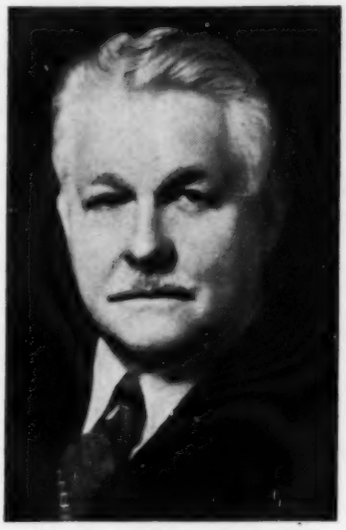
"If both the government and the manufacturers could agree on a practical depreciation formula based on this characteristic of machine tools," Mr. Giebels pointed out, "many would be in a better position to modernize their shops. We are not optimistic about getting that kind of legislation before Congress immediately, although we understand that it is being given consideration."

"Experience has shown," Mr. Giebels said, "that active buyers of machine tools are those who produce a product of merit. It is interesting to watch what a change in management does to a manufacturing plant. It generally means considerable revamping of products and manufacturing methods. There are a number of reorganizations taking place."



***SMALL MOTOR SHAFT** is machined to precision on semi-automatic lathe at General Electric's new $3-million motor plant in San Jose, Calif. The plant, formally dedicated last month, ultimately will produce all the company's output of single-phase integral hp. motors*

Names in the News



Frank Lincoln

E. V. Crane

Frank Lincoln has been elected chairman of the board of the Hy-Pro Tool Co. (subsidiary of Continental Screw Co.) New Bedford, Mass., manufacturers of high speed steel commercial and precision ground taps.

Claude M. Lamb has been appointed sales manager, Industrial V-Belt Division, and assistant to vice president in charge of mechanical sales of the Dayton Rubber Co., Dayton, Ohio.

Robert L. Halsted has been named manager of Allis-Chalmers Cleveland district office.

John L. Cook, former president of Winter Brothers Co., Wrentham, Mass., a subsidiary of National Twist Drill and Tool Co., Rochester, Mich., has been elected president of National Machine Products Co., Detroit. He succeeds Clare L. Brackett, who died very suddenly on Oct. 4, and who had been president of the company since 1916.

G. Henry Keeton, 6432 Cass Ave., Detroit, has been appointed sales and engineering representative for the state of Michigan for the Kelly Reamer Co., Cleveland, Ohio.

Richard W. Schreck has been appointed Michigan divisional sales representative for the Watson-Stillman Co., Roselle, N. J.

Henry T. Schlachter has been appointed representative in Southern Ohio and Northern Kentucky for the Detroit Broach Co. His office is located at 426 Transportation Bldg., Cincinnati 2, Ohio.

E. V. Crane, internationally known engineer in the press industry, has been named chief engineer of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

George W. Coultas, industrial engineer, has joined the engineering staff of the Parker Appliance Co., 17325 Euclid Ave., Cleveland, Ohio.

H. E. Baksiger has been appointed director of engineering for Landis Tool Co., Waynesboro, Pa., manufacturers of precision cylindrical grinding machines.

Arthur W. Krause and **Alvin M. Cunningham** have joined the engineering division of the Gas Machinery Co., 16100 Waterloo Road, Cleveland, Ohio.

Martin C. Butters, consulting engineer, formerly connected with E. I. DuPont de Nemours & Co., has joined the staff of the O. K. Tool Co., Inc. of Shelton, Conn., manufacturers of inserted blade milling cutters and single point metal cutting tools.

Frank R. Kohnstamm was appointed senior vice president of the Jack & Heintz Precision Industries, Inc. and **Otto Theodore Hess,** general counsel and secretary of the company was appointed assistant to the president.

B. A. Woina, former chief engineer of Mullins Manufacturing Co., Cleveland, Ohio, has been appointed director of their sheet metal products development and production engineering division.

John W. B. Pearce, chief engineer of the universal joint department of the Dana Corp.'s Spicer Mfg. Division and oldest Spicer employee in point of service, retired Dec. 1.

Wilmer P. Hauch has been appointed manager of manufacturing of the General Electric Co.'s heating device factories at Bridgeport, Allentown, Pa., and Brockport, N. Y.

D. R. Feemster has been appointed plant manager in charge of production and engineering for Bingham Stamping Division of the Bingham-Herbrand Corp., Toledo, Ohio.

N. George Belury has been appointed president of the Engineered Castings Division of the American Brake Shoe Co. Mr. Belury will be located at the division's headquarters in Rochester, N. Y.

Frank E. Stewart, general superintendent of Pacific Car & Foundry Co., Renton, Wash., from 1935 to 1946 and more recently project manager on a car erection and repair job in the plant, has retired after 31 years with the company.

T. W. Baush

T. W. Baush has been appointed general export sales manager of the Van Norman Co., Springfield, Mass., and the Morse Twist Drill Co., New Bedford, Mass.

John P. Wilkinson has been appointed assistant to the president and **James M. Lewis** has been appointed manager of roll sales for Lewis Foundry & Machine Division of Blaw-Knox Co., Pittsburgh, Pa.

J. B. Scott has been appointed quality control manager of Borg-Warner Corp.'s Ingersoll Steel Division plant at Kalamazoo, Mich.

Thomas B. Moule

Thomas B. Moule, formerly assistant director of sales, has been named sales manager of the Plomb Tool Co., Los Angeles, Calif.

Selden T. Williams, vice president of Scovill Mfg. Co., Inc., was appointed general manager of A. Schrader's Son Division, Brooklyn, N. Y.

F. C. Berliner has joined Maysteel Products, Inc. as sales manager.

Frank L. Oldroyd has been appointed sales manager of the Industrial Division of Oakite Products, Inc., New York, N. Y.

James R. Longwell, for the past four years director of engineering and research, Carboloy Co., Inc., Detroit, has been named assistant to the president, and **F. C. Ritner** has been appointed vice president in charge of engineering and research.

BUSINESS ITEMS

W. C. Dunn Co., Cincinnati, Ohio, an ownership which has been dormant for five years, has filed incorporation papers. The company will manufacture special equipment for railroad rolling stock maintenance.

The Billings and Spencer Co. of Hartford, Conn., makers of Drop Forged Wrenches and Shop Tools, have established an Emergency Service Warehouse in Chicago.

Purchase of physical assets, patents and trade-marks of **Heating Research Corp.,** Anderson, Ind., by **Stewart-Warner Corp.,** Chicago, was announced by James S. Knowlson, Stewart-Warner president and board chairman.

Donald D. Menhenett, formerly associated with **Plasti-Kote, Inc.,** has incorporated his own company, **Sprayon, Inc.** The company will manufacture and distribute on a national scale several products in the protective coating field.

The Cleveland Automatic Machine Co., manufacturer of a complete line in Single Spindle Automatics and High-Pressure Hydraulic Diecasting Machines, has moved its New York District Office, under the management of R. T. Carroll, from New York City to Newark 2, N. J. The new address is 1060 Broad St., Industrial Bldg., Newark 2, N. J.

The U.S.-Burke Machine Tool Co., Cincinnati, Ohio, has purchased the **Burke Machine Tool Co.,** formerly located at Conneaut, Ohio.

Orest A. Meykar is opening an office at **The American Machinery and Materials Co.,** 2817 Astoria Blvd., Long Island City 2, N. Y., to handle general mechanical engineering and tooling and production problems.

A. T. & G. Co. are moving from 1213 Beech St., Detroit, Mich., to a new and larger plant on 30790 W. Eight Mile Road. The mailing address will be P. O. Box 7, Brightmoor Station, Detroit 23, Mich.

The **Nilsen Engineering Co.,** 101 Washington St., Salem, Mass., has been appointed exclusive representative in the six New England States for **Airmatic Valve, Inc.,** Cleveland, Ohio.

Babcock & Wilcox Co.'s Barberton, Ohio plant has added a third story to the main building to provide increased space for the engineering department.

The **Adamas Carbide Corp.,** formerly of Long Island City, N. Y., has moved to Harrison, N. J.

Maumee Malleable Castings Co., Toledo, Ohio, has purchased two Milan, Mich., corporations for an amount reported in excess of $1,000,000.

D. J. Young and Henry C. Young who have been conducting the business known as **D. J. Young Tool & Machine Works,** Syracuse, N. Y., has been dissolved and Henry C. Young announces that he is continuing to do business at that address under the name of **H. C. Young Tool & Machine Co.**

Eaton Mfg. Co. has announced the purchase from the War Assets Administration of a mfg. plant at Saginaw, Mich., for approximately $750,000.

Gilmore Steel & Supply Co., San Francisco, has announced the purchase of **Oregon Steel Mills** of Portland, Ore. Arthur M. Mears Ore. president, will remain as consultant, A. G. Thies, vice president of Gilmore Steel, reported. Oregon Steel has been manufacturing bars, angles and structural material.

Precision Tool Co. of New London, Inc., New London, Conn., a new concern, has leased a part of the Whiting plant on Howard St., and will install equipment at once to do contract machining and make dies.

F. A. Smith Mfg. Co., Inc. announces a change of name. From now on, the company will be known as **Fasco Industries, Inc.,** Rochester 2, N. Y.

Cerro de Pasco Copper Corp., N. Y. C., announces the appointment of **Peck Steel and Die Supply,** 4436 Long Beach Ave., Los Angeles, Cailf., as their West Coast distributor of CERRO low-temperature-melting alloys effective November 1. **Peck Steel and Die Supply** succeeds **Composite Die Supply** in this capacity.

Garrett Supply Co., 3844 S. Santa Fe Ave., Los Angeles, Calif., has been recently appointed as distributor in the Los Angeles area for the **Butterfield Division, Union Twist Drill Co.,** manufacturers of taps, dies, reamers, screwplates and other industrial cutting tools. **The Arrow Machine Tool Co.,** 251 Richmond St., Providence, R. I., has been appointed exclusive distributor in Providence and vicinity for the **Butterfield Division.**

Obituaries

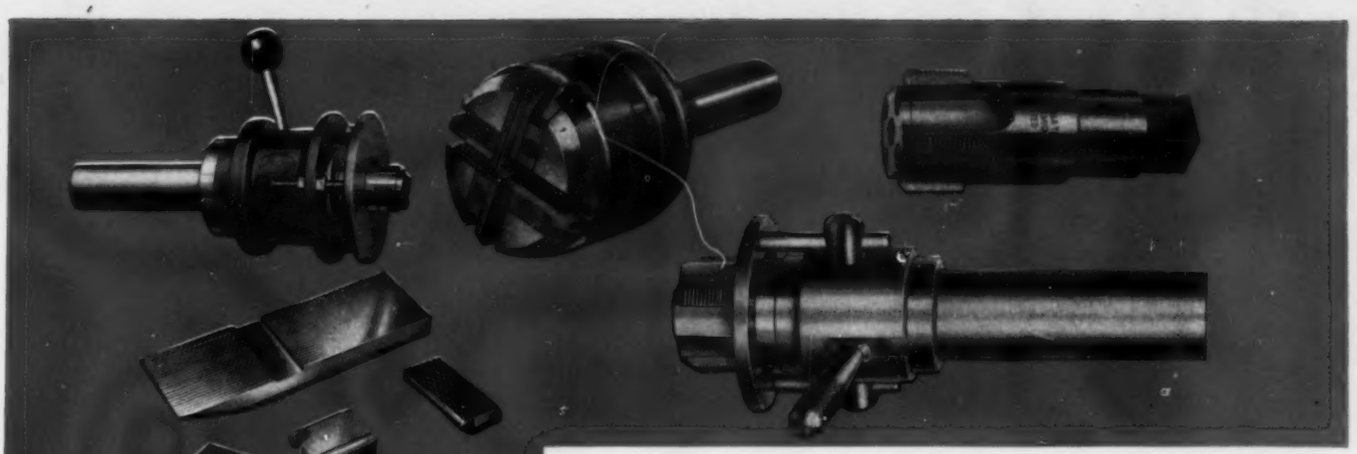
J. Earl Peterson, 57, industrial executive who had been in charge of the Washington office of Lima-Hamilton Corporation, died recently at his home in Hamilton, Ohio.

Joseph C. Regan, 76, Windsor Locks, Conn., retired president and general manager of E. Horton & Sons, Inc., machine tool manufacturers, died Nov. 18.

Bennett M. Leece, 72, president of the Leece-Neville Co., Cleveland, died at his Shaker Heights home December 5.

Donald W. Carter, 52, owner of the Carter Diamond Tool Co., died at his Cleveland home Nov. 20.

Horace R. Justice, 60, died Dec. 4 at his Eaton, Ohio, home. He was owner of the Eaton Screw Products plant.



BIGGER DIVIDENDS

with MURCHEY MODERN THREADING TOOLS

Here's why—**Fullest value and biggest dividends from your machine tool investment come only from the use of modern, efficient metal removing tools.**

Murchey collapsible taps, self-opening die heads, and special threading tools represent the newest, most modern threading tools of their kind available to industry. They have been engineered to the pace set by modern production requirements. Outstanding and exclusive features contribute to *lowest cost per thread.*

Call for a Murchey man to work with you on your threading problems—no obligation.

Catalogue available upon request.

Lowest cost per thread . . .
WITH MURCHEY TOOLS

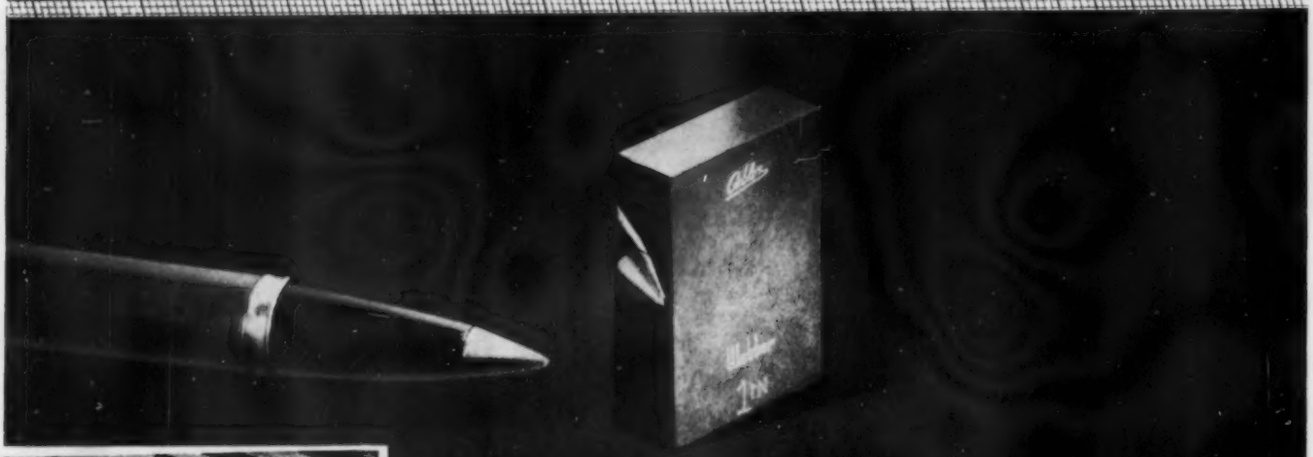
Manufacturers of collapsible taps, self-opening die heads (tangent and radial chaser types) and special threading tools

MURCHEY MACHINE & TOOL CO.

MURCHEY

SUBSIDIARY OF THE SHEFFIELD CORP.
DAYTON 1, OHIO, U. S. A.

...the surface analyzer says, .3 rms



...the reflection says "mirror finish"

84B—84 block set (steel)
Accuracy: .000008....$235.00

Angle Gage Blocks increase speed and precision of angle inspection.

Carblox Wear Gages add the wearing qualities of carbide to any standard steel gage block set. Set of 2 with case Two Sizes
.100 .....$21.50
.050 ..... 27.50

The surface finish and flatness of a gage block determines to a large extent its usefulness as an inspection gage.

In the development of these qualities all the craftsmanship of Webber Gage makers is called into play. The ability of the blocks to meet these tests determine their acceptance as tools of precision measurement.

Both of these qualities are at the top of the list of many inspection tests that each block must undergo before it is placed in its case.

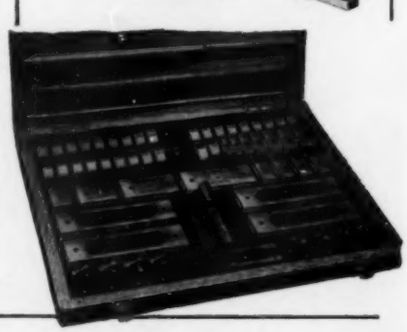
Webber Gage Blocks are the product of specialists whose sole aim is to improve the idea and method of making blocks. No other activity can interfere with this single purpose.

Today Webber offers blocks of steel or carbide for both angular and linear measurement and a variety of fixtures to extend the uses to which they are put.

When buying blocks specify "WEBBER" and be assured of the best the industry offers.

WEBBER GAGE COMPANY
12901 Triskett Rd. Cleveland 11, Ohio

Webber
MICRO-ACCURATE GAGE BLOCKS and FIXTURES



Transferring the extreme precision of gage blocks to the work is one of the outstanding advantages of Webber Heavy Duty (Steel) Gage Blocks and Fixtures. Used as Scriber, Divider, Height Gage and Snap Gage.

American Machinist REFERENCE BOOK SHEET

Horsepower for Overhead Chain Conveyors

BY S. W. JESSOP, Chief Estimator JARVIS B. WEBB COMPANY

MOTOR HORSEPOWER requirements for overhead chain conveyor drives may be determined from the following formula:

$$\text{Horsepower} = \frac{P_T \times V}{33{,}000 \times E}$$

where,

P_T = total chain pull (lb.)
V = maximum speed (fpm.)
E = factor of efficiency

Total chain pull is computed from the following formula:

$$P_T = P_e + L$$

where,

P_e = chain pull (lb.)
L = lift load (lb.)

Chain pull is the effort required to pull the conveyor chain, which may be expressed as:

$$P_e = (W_c + W_m)F$$

where,

W_c = total weight of the moving conveyor (lb.), including chain, trolley, load bars and carriers
W_m = total weight of material conveyed (lb.)
F = coefficient of friction

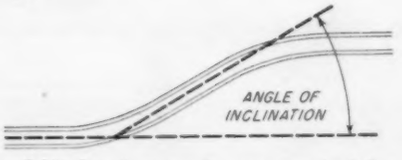
Coefficient of friction depends upon the trolley and the application. By running tests, the frictional coefficient of the trolley may be determined. Normal practice is to double this figure to allow for additional friction developed by the *usual* number of turns and vertical bends. The usual number is four turns and four vertical bends per 100 ft. An *average* and *common* coefficient of friction is 3%. Some trolleys, however, test higher than 3%; included are "needle bearing" trolleys and some with "full complement of balls."

Each application must be studied to determine the correct coefficient. Conditions that tend to increase the coefficient over the 3% figure are: a large number of small-radius turns, large number of vertical bends, high heat in ovens, abrasive or corrosive atmospheres, cold temperatures, automatic turning devices for swivels, and special apparatus such as collector shoes on conductor bars of electrified trolleys.

The second factor, lift load, must be taken into account where:

1. A vertical bend rise is not compensated by a vertical drop of equal height.

2. There is no compensating down load before the drive; all the load goes up, but none comes down. This happens when material is loaded on one floor and is immediately raised to higher levels for operations or processing.



Lift load may be computed by two methods:

Method 1:

Lift Load (lb.) equals weight of material conveyed on the slope times sine of the angle of inclination.

Method 2:

$$L = \frac{H \times W_A}{S}$$

where,

H = total vertical lift (ft.)
W_A = average weight of one load (lb.)
S = spacing of loads (ft.)

This method is inaccurate when the load spacing becomes greater than the vertical rise on smaller slopes.

The factor of efficiency in the formula depends upon the drive, and varies from 0.85 for simple drives with a small-ratio reducer to 0.55 for a drive with many reductions and high-ratio reducers. An average figure is 0.75.

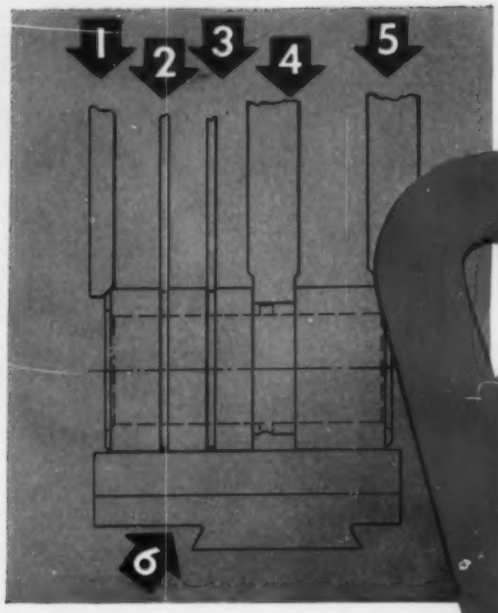
If values for the coefficient of friction and for the factor of efficiency are properly judged, no additional safety factor need be added to the horsepower indicated in the above formula.

More Than One Drive

In the case of a very long conveyor or one with a very heavy chain pull, it may be advisable to use more than one drive. This is necessary to keep the stresses in the chain at a safe limit. In such case, floating balanced drives may be used.

A floating drive is arranged so the supporting frame rotates or floats within a fixed frame against springs. If chain pull becomes dangerously excessive, the rotating or floating frame contacts a limit switch and shuts off the motor.

A floating balanced drive is a floating drive with the addition of a control arm attached to the fixed frame and to a variable-speed transmission which can slow the drive or speed it up. When two or more drives of this type are used on a line, the operation is as follows: When one drive becomes heavily loaded it floats in its frame, causing the mechanical control arm to slow that drive. When this happens, additional load is thrown on the second drive by the chain, and because of this, the second drive slows down a little. Meanwhile, as the load is relieved from the first drive, it picks up speed. This action continues until both drives are pulling their share of the load at the same speed.



6 point savings in tools...

WHEN THE TOOLS ARE TANTUNG

Tantung tools produced, in 6¾ hours, the work formerly requiring 13½ hours with high speed steel tools

Actual performance figures obtained in shops all over the country repeatedly prove Tantung superiority over high speed steel tools on jobs requiring increased production and tool life.

6 Tantung tools in a multiple tool set-up for grooving, chamfering, turning, facing and cut-off operations again pointed the way to doubled performance AT NO EXTRA COST!

For more pieces per grind at speeds and feeds above high speed steels and just below those of carbides your choice should be TANTUNG.

It's that extra speed and feed on your present equipment that means more profitable metal removing operations for you... and that extra speed and feed is obtained easily with TANTUNG.

Here's a multiple tool operation that enabled a mass production manufacturer to double his production at no extra cost.

Performance Data

MACHINE:	Conesmatic, 8 spindle.
PART:	Overdrive Stationary Gear.
MATERIAL:	S.A.E. 4042 (cold drawn).
OPERATION:	Grooving, chamfering, facing, turning and cut-off operations to close tolerances and fine finish.

Comparative Test Data

	TANTUNG	H.S.S.
Rev. Per. Min.	305	230
S.F.M.	135	105
Cycle Time	24.5 sec.	57.0 sec.
Pieces per grind	1000	425
Feed: Front slide	.0014	.0006
Back slide	.003	.0015

For that extra added performance that means a greater margin of profitable operation with TANTUNG call your nearest V-R branch office TODAY! If you want increased production over high speed steel tools and are unable to use carbides because of equipment limitations TANTUNG is your answer.

District Sales and Service in Principal Cities

V-R CARBIDE and TANTUNG

vascoloy-ramet corporation

WAUKEGAN • ILLINOIS

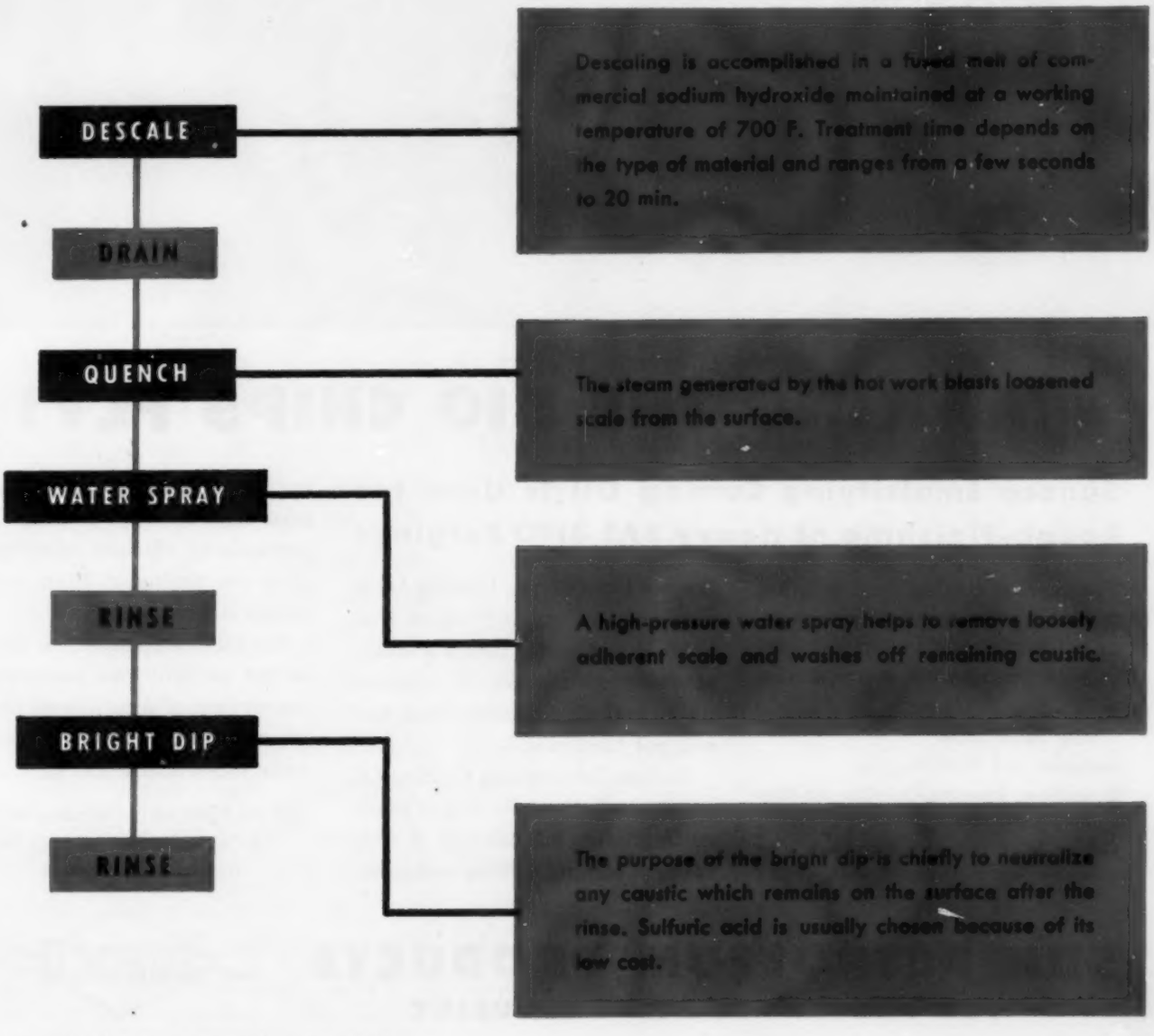
An affiliate of The Fansteel Metallurgical Corporation and The Vanadium Alloys Steel Company

Process Sheet for Sodium Hydride Descaling

BY GEORGE BLACK

The sodium-hydride descaling process is based on the fact that oxygen-hungry sodium hydride, by reducing the oxides in scale, turns it into a loose and flaky powdery mass. This is blasted off by the steam formed when the metal part heated to 700 F. is quenched in cold water. The process is suitable for all metals which are not affected by contact with molten caustic at elevated temperatures.

The descaling operation is uniform and results in clean bright surfaces. As only the scale is attacked, original dimensions are maintained, and pitting or embrittlement of the metals being treated is avoided. Alloys of chromium, copper, nickel, tungsten and cobalt, as well as plain carbon steels, have been processed satisfactorily by application of the sodium hydride descaling process.


DESCALE
Descaling is accomplished in a fused melt of commercial sodium hydroxide maintained at a working temperature of 700 F. Treatment time depends on the type of material and ranges from a few seconds to 20 min.
DRAIN
QUENCH
The steam generated by the hot work blasts loosened scale from the surface.
WATER SPRAY
RINSE
A high-pressure water spray helps to remove loosely adherent scale and washes off remaining caustic.
BRIGHT DIP
RINSE
The purpose of the bright dip is chiefly to neutralize any caustic which remains on the surface after the rinse. Sulfuric acid is usually chosen because of its low cost.

MAKING THE BIG CHIPS FLY!

Sunoco Emulsifying Cutting Oil Is Used for Rough-Finishing of Heavy SAE 3140 Forgings

The correct cutting fluid is a big factor in the continuous heavy-duty machining of tough steel forgings on the machine shown above.

Machine: Warner & Swasey 4-A Heavy-Duty Turret Lathe

Material: SAE 3140 Forging

Operation: Roughing-Out Cap for Pile-Driving Machine

Cutting Fluid: 1 part Sunoco Emulsifying Cutting Oil to 20 parts water

Sunoco Emulsifying Cutting Oil is a viscous, self-emulsifying oil that quickly and easily forms a stable emulsion with water. It contains no animal or vegetable fats, and will not turn rancid.

Sunoco Emulsifying Cutting Oil meets the demand not only of tough cutting jobs, but also of a wide range of turning, milling and grinding operations calling for close tolerances and fine finishes. It is particularly efficient where precision machining at high cutting speeds is demanded.

For full information, for samples to test on your own machines, for the services of a cutting oil specialist, call your nearest Sun office. Or write Department AM-12.

SUN OIL COMPANY • *Philadelphia 3, Pa.*

In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

Minimum Hub Diameters

BY B. P. ASTLEY, Assistant Chief Engineer,
B. F. PERKINS & SON, INC.

Values of minimum hub diameters are tabulated for cams, gears, sprockets and pulleys fixed to shafts from ½ to 3 in. in diameter by a standard square key and setscrew over the key. Basis for the table is the formula:

$$\text{Min. Hub. Diam.} = \left(\sqrt{\left(\frac{D}{2}\right)^2 - \left(\frac{W}{2}\right)^2} + d + L\right)2$$

Where:

W = Keyway width
D = Shaft diameter
d = Keyway depth
L = Length of setscrew

SHAFT DIAM., IN.	KEYWAY, IN.	SETSCREW SIZE AND LENGTH	MIN. HUB DIAM., IN.
1/2	1/8 x 1/16	1/4 -20 x 1/4	1- 3/32
9/16	1/8 x 1/16	1/4 -20 x 1/4	1- 5/32
5/8	3/16 x 3/32	5/16-18 x 5/16	1-13/32
11/16	3/16 x 3/32	5/16-18 x 5/16	1-15/32
3/4	3/16 x 3/32	5/16-18 x 5/16	1-17/32
13/16	3/16 x 3/32	5/16-18 x 5/16	1-19/32
7/8	3/16 x 3/32	5/16-18 x 5/16	1-21/32
15/16	1/4 x 1/8	3/8 -16 x 3/8	1-29/32
1	1/4 x 1/8	3/8 -16 x 3/8	1-31/32
1- 1/16	1/4 x 1/8	3/8 -16 x 3/8	2- 1/32
1- 1/8	1/4 x 1/8	3/8 -16 x 3/8	2- 3/32
1- 3/16	1/4 x 1/8	3/8 -16 x 3/8	2- 5/32
1- 1/4	1/4 x 1/8	3/8 -16 x 3/8	2 -7/32
1- 5/16	5/16 x 5/32	7/16-14 x 7/16	2-15/32
1- 3/8	5/16 x 5/32	7/16-14 x 7/16	2-17/32
1- 7/16	3/8 x 3/16	1/2 -13 x 1/2	2- 3/4
1- 1/2	3/8 x 3/16	1/2 -13 x 1/2	2-13/16
1- 9/16	3/8 x 3/16	1/2 -13 x 1/2	2- 7/8
1- 5/8	3/8 x 3/16	1/2 -13 x 1/2	2-15/16
1-11/16	3/8 x 3/16	1/2 -13 x 1/2	3
1- 3/4	3/8 x 3/16	1/2 -13 x 1/2	3- 1/16
1-13/16	1/2 x 1/4	9/16-12 x 9/16	3-11/32
1- 7/8	1/2 x 1/4	9/16-12 x 9/16	3-13/32
1-15/16	1/2 x 1/4	9/16-12 x 9/16	3- 1/2
2	1/2 x 1/4	9/16-12 x 9/16	3- 9/16
2- 1/16	1/2 x 1/4	9/16-12 x 9/16	3- 5/8
2- 1/8	1/2 x 1/4	9/16-12 x 9/16	3-11/16
2- 3/16	1/2 x 1/4	9/16-12 x 9/16	3- 3/4
2- 1/4	1/2 x 1/4	9/16-12 x 9/16	3-13/16
2- 5/16	5/8 x 5/16	5/8 -11 x 5/8	4- 3/32
2- 3/8	5/8 x 5/16	5/8 -11 x 5/8	4- 5/32
2- 7/16	5/8 x 5/16	5/8 -11 x 5/8	4- 7/32
2- 1/2	5/8 x 5/16	5/8 -11 x 5/8	4- 9/32
2- 9/16	5/8 x 5/16	5/8 -11 x 5/8	4-11/32
2- 5/8	5/8 x 5/16	5/8 -11 x 5/8	4-13/32
2-11/16	5/8 x 5/16	5/8 -11 x 5/8	4-15/32
2- 3/4	5/8 x 5/16	5/8 -11 x 5/8	4-17/32
2-13/16	3/4 x 3/8	3/4 -10 x 3/4	4-31/32
2- 7/8	3/4 x 3/8	3/4 -10 x 3/4	5- 1/32
2-15/16	3/4 x 3/8	3/4 -10 x 3/4	5- 3/32
3	3/4 x 3/8	3/4 -10 x 3/4	5- 5/32

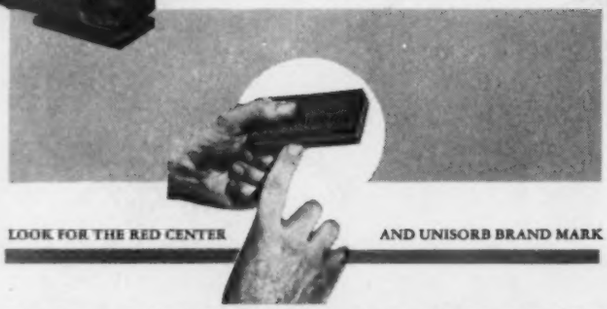
Deadens Vibration...No Floor Drilling Needed

UNISORB is the up-to-date mounting solution for machines of practically every description. It can be used on any kind of flooring.

A special cement supplied by us for this purpose exclusively, grips the UNISORB pads to machine feet and floor with a holding strength of 1500 lbs. per sq. ft. *minimum*. You need no bolts, no lag screws . . . and you're free from old-fashioned, destructive floor drilling.

Add to these time-saving, money-saving installation advantages the fact that UNISORB absorbs from 60% to 85% of transmitted vibration and noise, and you'll understand *why* this is the new anchoring method that's sweeping through every industry today!

For full details, write . . . now.

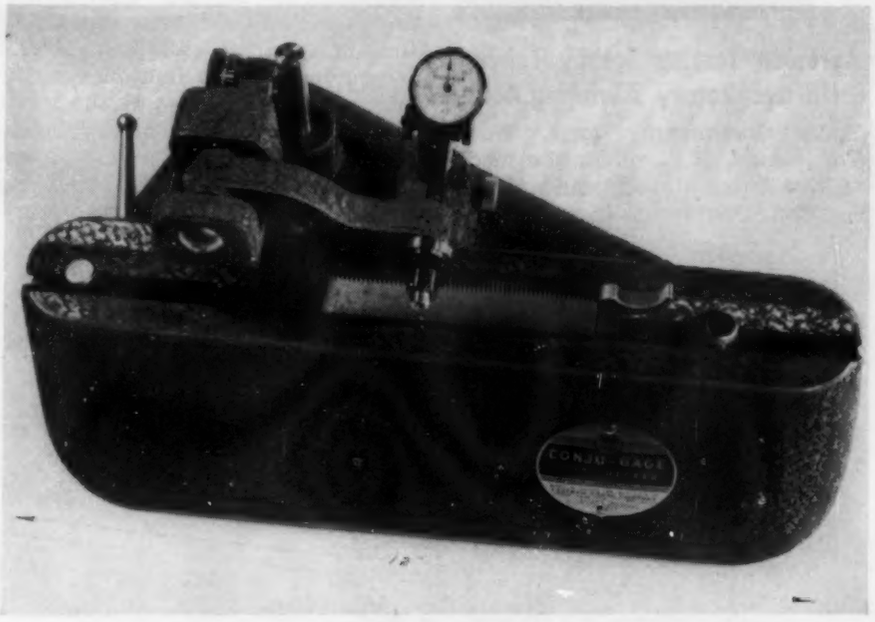


THE FELTERS COMPANY

210-N SOUTH STREET, BOSTON 11, MASSACHUSETTS

Offices: New York, Philadelphia, Chicago, Detroit
Sales Representatives: San Francisco, St. Louis
Mills: Johnson City, N. Y.; Millbury, Mass.; Jackson, Mich.

Shop Equipment News



Helical gears and spur gears can be checked with this instrument when a suitable angular fixture is used

Eastman Kodak Conju-Gage Checker Will Handle Gears to 1.25-in. P. D.

The Model 1-S Conju-Gage, a gear checker for checking spur or helical gears of any helix angle, is now available from Eastman Kodak Co., Rochester 4, N. Y.

One of the three models previewed last March at the ASTE show, the Conju-Gage provides a composite check of spur and helical gears of pitch diameter up to 1.25 in. Production of the two larger models is now underway. The larger models check gears of pitch diameters to 4.125 and 8.25 in., respectively.

The three models employ a new type gaging element, known as the Kodak Master Worm Section, which is ground as a section of a single threaded worm, and is said to be manufactured with greater accuracy than circular master gears. It can be used to check either spur or helical gears of the right or left hand, regardless of helix angle.

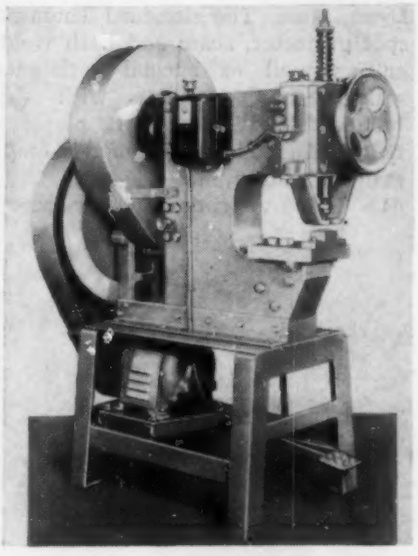
The master worm section is incorporated in a variable center-distance-type testing instrument. The gear is meshed with the rack-like worm section, which is traversed along its axis, and the variations in center distance measured either directly on a gage or by an automatic charting device. Close tolerances can be maintained as the master worm section is ground as a section of a worm on a thread grinder.

Master worms of 125 diametral pitch are now in use in Kodak's plants. No special center distance corrections are necessary when nonstandard gears are checked. Operating and standard pressure angle are always the same in a master worm section. Master worm sections can be made in non-involute forms, such as epicycloids, or as conjugates to modified involutes.

Holden Liquid Electrode Furnace Offers Inside Pot of 13x9x19 in.

The Holden Type 601 liquid electrode furnace with inside-pot dimensions of 13x9x19 in., is offered by the A. F. Holden Co., New Haven 8, Conn. The power conductors that transfer current to the pools which hold the liquid alloy are surrounded by refractory said to permit reduction in surface radiation area by 25%.

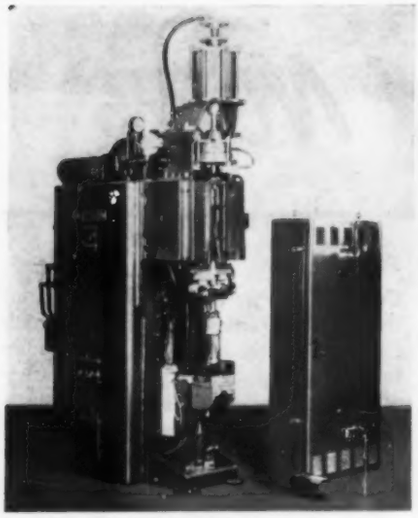
A starting coil permits the unit to be started on an electric resistance circuit, allowing it to be shut down for power failures by installing a resistance coil. The furnace has two or more pools separated by a ceramic barrier and containing a metal molten at operating temperatures. Temperature of molten pool is from 200 to 600 F. below the operating temperature of the salt bath.



Webs, Flanges of Small Beams, Punched with Single-End Machine

The Model P9 quick-acting single-end punching machine is announced by Julius Blum & Co. Inc., 432-540 W. 22nd St., New York 11, N.Y. The machine is adapted for punching the web and flanges of small beams and channels such as are used in railing, stair, and fire-escape work.

The punch can be lowered by hand for back-centering of the hole. Clutch is non-repeating. A triple-punch attachment can be furnished as optional equipment. Capacity in soft steel is 9/16 in. to ½ in. and ¾ in. to ⅜ in. Depth of throat is 12 in., stroke per min., 60. Machine is 45x27x60 in.



Welding System Converts 3-Phase Current to Single-Phase Current

The balanced-load welding system converts three-phase power to single-phase low-frequency resistant-welding current. The converter system is offered by Thomson Electric Welder Co., 163 Pleasant Street, Lynn, Mass. The standard Thomson spot projector, seam and flash welder, as well as special resistance welders are available with this balanced-load system. It places a balanced moderate demand on a standard three-phase 60-cycle, 220-, 440- or 550-v. primary power source.

Utility Hammers by Chambersburg Range in Sizes from 50 to 500 lb.

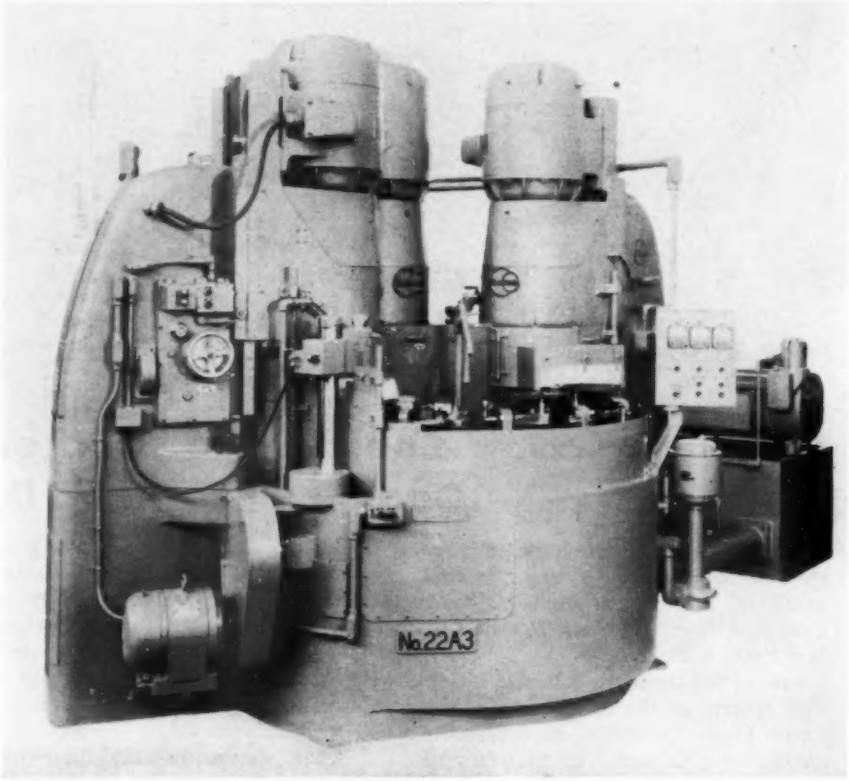
Chambersburg Engineering Co., Chambersburg, Pa., offers a general utility hammer made in a range of sizes from 50- to 500-lb. falling weight. An automatically lubricated power-saving cylinder is offered as well as alloy forged-steel flat dies.

Abrasion Testing Set by Taber Utilizes Rotary Abrading Action

Taber Instrument Corp., North Tonawanda, N.Y., offers the Model 100-109 Taber abraser standard testing set. The tester incorporates a rotary abrading action on a 4-in. specimen.

The wear results from alternately rubbing the flat faces of two resilient Calibrase wheels over the surface being tested. All types of surface finishes including electroplate, porcelain enamel, organic coatings, plastics, leather, and woven textile fabrics can be tested.

An improved suction pump has a vertical dust receiver with swinging nozzle adjustable for any thickness of specimen. The control unit is equipped with a built-in variable transformer for adjusting the speed of the suction turbine motor. Different materials require a varying degree of suction cleaning while being tested.



Blanchard Automatic Surface Grinder Holds Final Size Within ±0.0005 in.

An automatic surface grinder No. 22-A3 is offered by The Blanchard Machine Co., 64 State Street, Cambridge 39, Mass. The grinder has three wheels 22x4x16 in. and a worktable of 68-in. O.D., and 40-in. I.D.

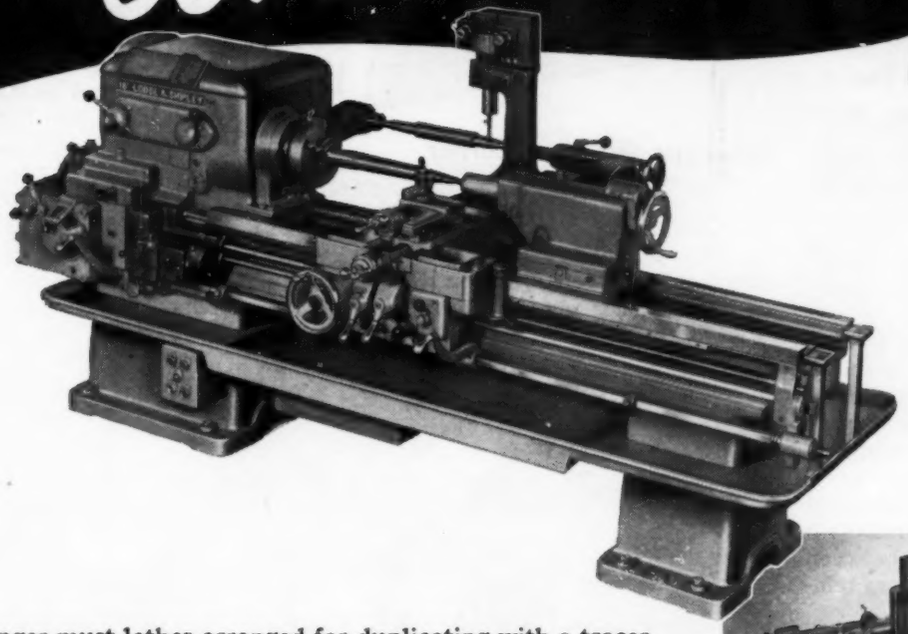
Work to be ground may be of any size that will lie between the inner and outer edges of the table. Standard height for work is 12 in. but greater heights can be handled by extending the columns.

The continuous-rotating table carries work in succession under the roughing and finishing wheels. Each wheel reduces the work height to that determined by the setting of the caliper for that wheel. Final size is held within ± 0.0005 in.

The coolant system provides for continuous removal of chips and sludge from the coolant. A motor-driven centrifugal pump of 150-gpm. capacity provides water to the wheels and to nozzles for washing the work and fixtures.

NOW INSTANT CHANGE-OVER for DUPLICATING or REGULAR WORK . . .

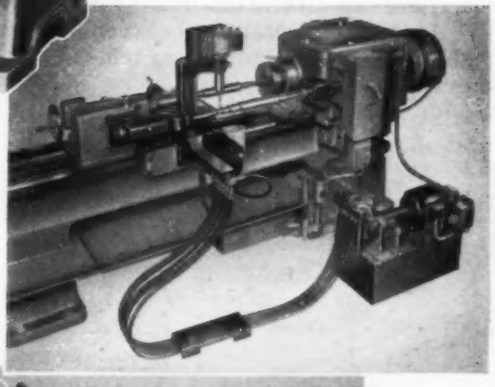
on the new LODGE & SHIPLEY COPYMATIC!



NO longer must lathes arranged for duplicating with a tracer controlled device be *special purpose machines!* The Lodge & Shipley COPYMATIC is a dual-purpose machine . . . can be used for COPYMATIC work or regular lathe work without limiting the range of either. It takes but a minute to change the set-up . . . there is nothing to take off or put on.

In Duplicating work, the COPYMATIC uses either round or flat templates. The first piece in the lot can be machined in the regular way and then used as a template for duplicating the balance of the lot. Exclusive design features permit the facing of sharp shoulders to extremely close limits.

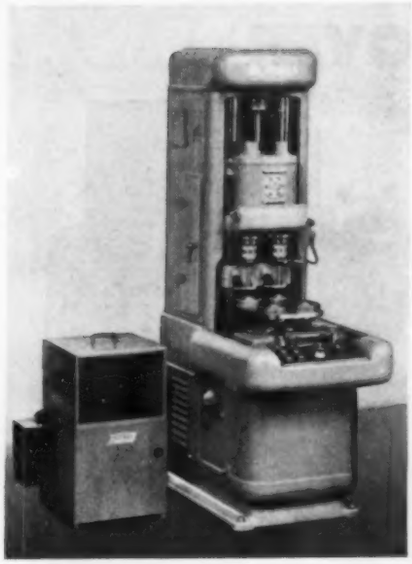
Applied to the Lodge & Shipley Model "X" line of 16 inch and 20 inch Lathes, the COPYMATIC is a combination of the finest lathe and modern automatic tracer duplicator. Ask your Lodge & Shipley Representative for additional details or write for new Bulletin No. 675.



Illustrations, from top to bottom: The COPYMATIC's all-hydraulic tracer head; 16" COPYMATIC Lathe; rear view of hydraulic control unit; and a few samples of multiple diameter shafts with sharp shoulder faces, grinding necks, tapers in both directions, chamfers and curved contours.

THE Lodge & Shipley COMPANY

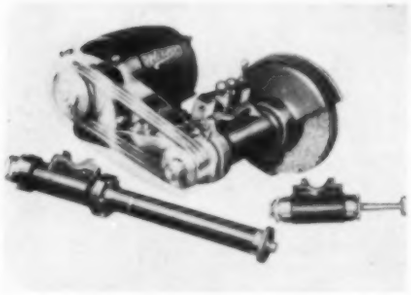
MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO



Frostrode 5-gpm. Coolant Cooler For Grinding, Machining Work

Frostrode Products, 2373 E. Eight Mile Road, Hazel Park, Mich., offers a 5-gpm. coolant cooler, Model 50-AC for grinding, honing, and machining operations. The new 50-AC is a companion model to the larger, 15-gpm. Frostrode coolant cooler Model 75-AC. It is designed to continuously maintain coolant temperature at a maximum of 20° below room temperature at rated capacity. It is a self-contained unit requiring no water connections.

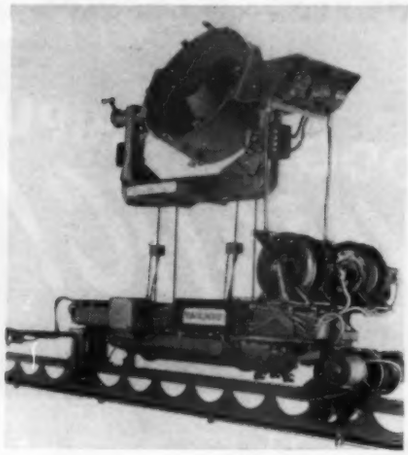
Thermostats on this standard model are adjustable to maintain any desired temperature between 20° below and 10° above room temperature.



Hisey-Wolf Redesigned Grinders Feature Change in Motor Mounting

The Hisey-Wolf Machine Co., Cincinnati 25, Ohio, offers a 1- and 2-hp. precision internal and external grinder. The redesigned sizes 1 and 2 hp. offer a change in the motor mounting.

An adapter base for the motor is now supplied with flat key and keyway between the adapter and main frame casting. The motor is mounted on the adapter with the usual four screws while only two screws clamp the adapter to the main frame, permitting a minimum time in adjusting the V-belts when clamping from the external to internal spindle head.



Automatic Overhead Carrier For Transporting Metal Chips

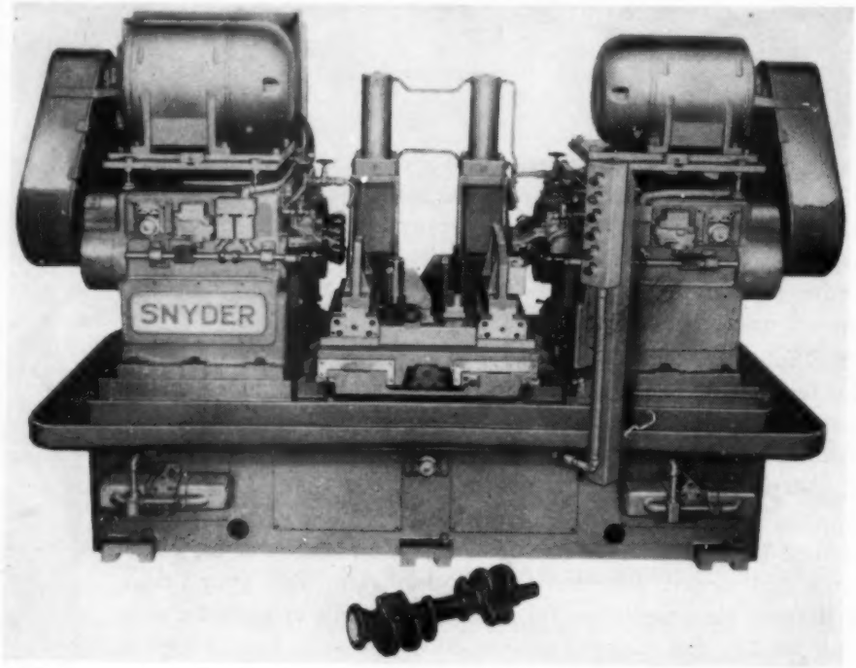
The Cleveland Crane and Engineering Co., Wickliffe, Ohio, offers an automatic carrier developed for transporting baskets of various metal chips from an oil extractor to any one of a number of storage bunkers. The carrier delivers, empties by turning the basket over, and returns automatically, without help of the operator.

Baskets have approximately 15-cu. ft. capacity which takes 1000-lb. loads of chips. They are clamped into position by a hand crank and turned over automatically at a speed of 12½ rpm. at destination. A dial selector located just above the crank enables the preselection at any station to which it is desired to dispatch a load.

Portable Electric Polishers Offer Speeds to 1500 rpm.

The Van Dorn Electric Tool Co., Towson 4, Md., offers an improved portable electric polisher. Both standard and automatic models have been redesigned. Polishers have had the gearing changed to a single-reduction spiral bevel gear similar to that now used on Van Dorn sanders.

The change has increased the motor power approximately 30% and the speed of both units to 1500 rpm. Polishers come equipped with a 7-in. molded rubber pad, a 7-in. sponge-rubber cushion pad, and a lambswool buffing pad. Cleaning liquid is fed through the hollow spindle to work.



SPECIAL-PURPOSE MACHINE built by Snyder Tool & Engineering Co., E. Lafayette, Detroit, Mich., faces and center drills the ends of crankshaft forgings at the rate of 47 pieces per hr. at 80% efficiency. Forging is located in the fixture manually and held by means of hydraulically actuated clamps. Centering drills are high-speed steel operating at a tool speed of 60 fpm. Machine is adaptable to a wide range of part lengths and is fully adjustable in speeds and feeds. The stroke is adjustable from 8 to 12 in.

Machine Tools...

assembled with

AMERICAN PHILLIPS MACHINE SCREWS...

Cost Less to Make—

and to Use

THE BUILDER SAVES . . . because straight-driving, easy-handling American Phillips Screws cut assembly time as much as 50%. What's more, these modern, *engineered* screws banish burrs, outlaw scarred work-surfaces—and give a precision machine the final outward mark of inward quality.

. . . AND THE BUYER SAVES, TOO . . . because every screw has been turned up flush, to utmost tightness . . . thereby minimizing vibration, and all the other headaches that follow when you get "a screw loose." And there are no burred heads to snag clothes, slash hands, cause accidents, lose time. Couldn't *you* use these advantages *and savings,* in your own product? Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

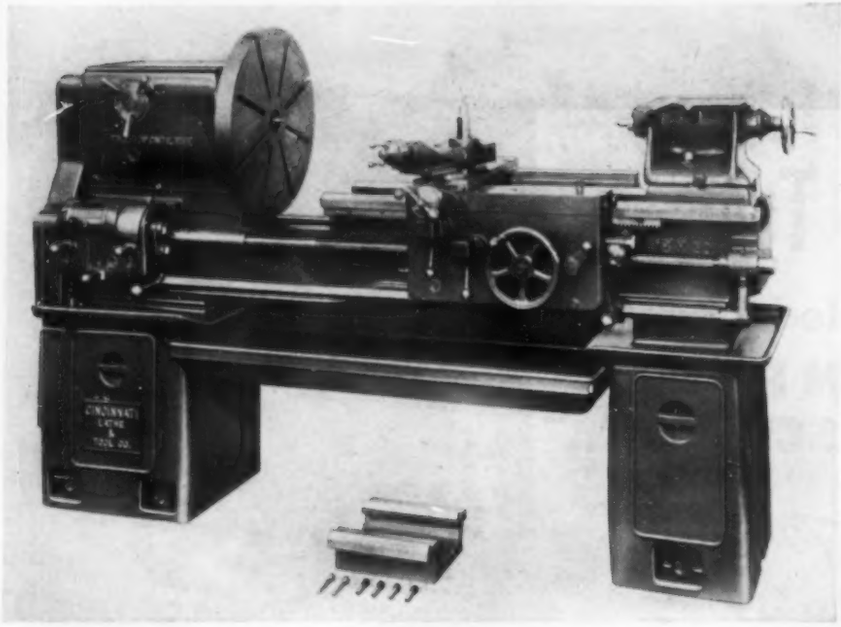
Chicago 11: **589 E. Illinois St.** *Detroit 2:* **502 Stephenson Building**

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)



Cincinnati Fixed-Gap-Bed Lathes For Medium-, Light-Duty Operations

Cincinnati Lathe and Tool Co., Oakley, Cincinnati 9, Ohio, offers a series of fixed-gap-bed lathes. Called the fixed-gap-bed Cinulathe, the machine is designed for medium- and light-duty engine lathe application. It accommodates large diameters, that do not require the use of a heavy lathe.

The standard (medium-duty) fixed-gap-bed Cintilathe, is offered in six swing sizes; namely, 14, 16, 18, 20, 22, and 24 in., with distance between centers from 30 in. in increments of 24 in. Motors supplied are standard and are as follows: 14 in., 3 hp.; 16 in., 5 hp.; 18 in., 5 hp.; 20 in., 7½ hp.; 22 in., 10 hp.; and 24 in., 15 hp.

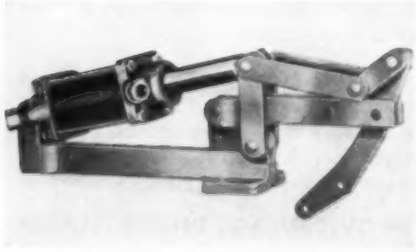
The tray-top light-duty fixed-gap-bed Cintilathe is offered in two swing sizes, 15 and 18 in., with distances between centers from 18 in. in increments of 6 in. The motors supplied are standard: 15 in., 2 hp., and 18 in., 3 hp.

Hard Chrome Plating Is Offered On Gaging Surfaces of Plug Gage

The Standard Gage Co. Inc., Poughkeepsie, N. Y., offers the chromium plated DuBo plug gages. Plug gages are recommended for especially long runs and for checking the more abrasive materials such as aluminum castings. A DuBo member is entered with its spherical gaging surfaces out of range of the bore walls and following entry the gaging surfaces are rocked into contact, or potential contact with the inside of the bore. Much of wearing, frictional action common to cylindrical plugs is said to be avoided.

Sheffield Automatic Machine Checks, Segregates Piston Pins

Piston pins are checked for average diameter and automatically segregated into six classifications by a machine offered by the Sheffield Corporation, Dayton 1, Ohio. Production segregating rate is approximately 2400 pins per hr. Pins are manually loaded into a chute which has a "no go" gaging fixture to prevent oversize parts from being accepted.



Toggle-Action Air-Operated Clamp Secures Around-the-Corner Work

A toggle-action air-operated clamp is offered by the Lapeer Mfg. Co., Lapeer, Mich. The clamp is designed for holding around-the-corner work. Listed as the Model DTAO-400, the clamp produces a plier-like grip. The supporting pressure of the toggle bar is 400 lb. at the outer rivet and the clamping pressure of the toggle jaw is approximately 300 lb. at the inner hole. Operating air pressure is 85 lb.

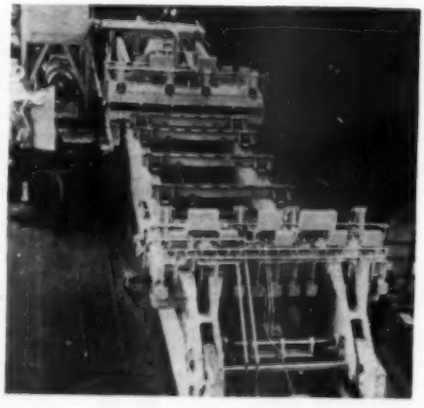
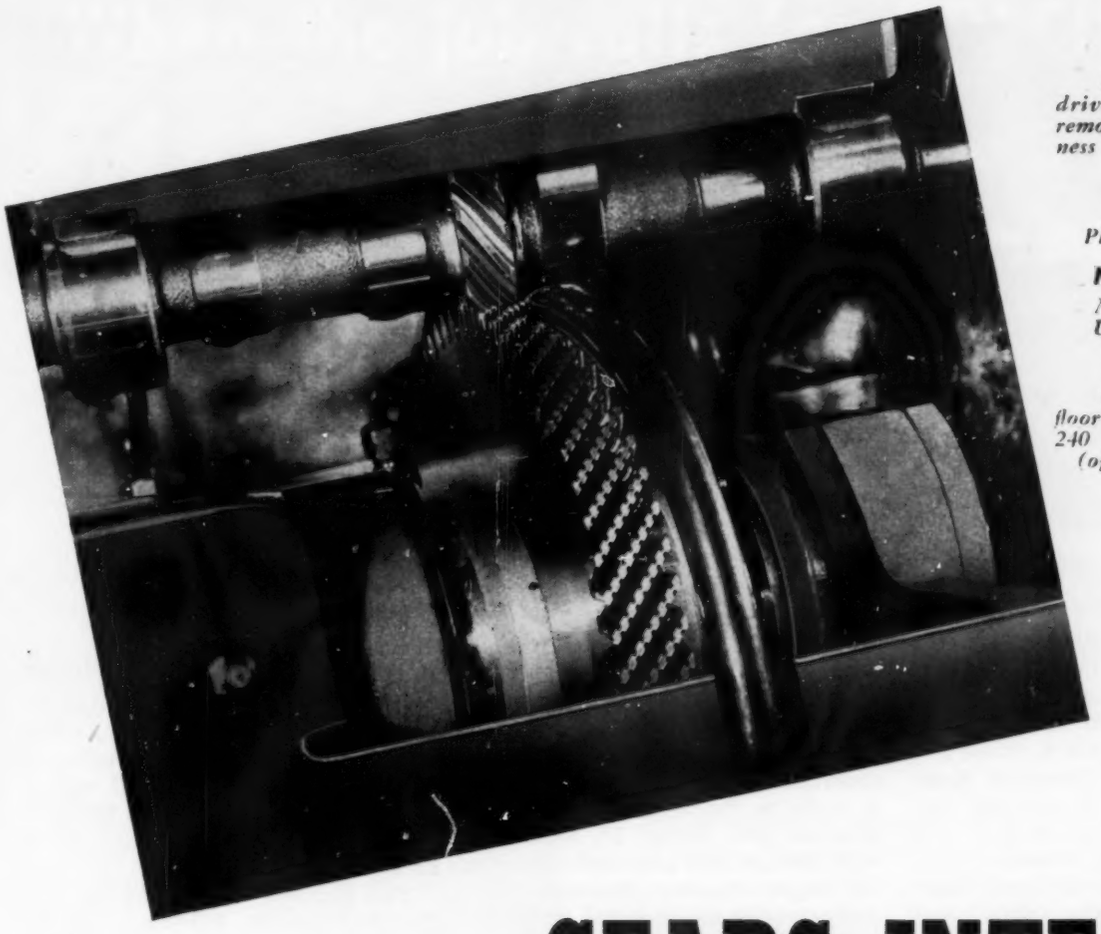


PLATE-STRETCHER-LEVELLER is offered by Hydropress, Inc., 570 Lexington Ave., New York 22, N. Y. The 1000-ton hydraulic plate-stretcher-leveller handles plate and sheet up to 11x31 ft. The unit is a self-contained oil-hydraulic type. A plate support, consisting of five moveable carriages, facilitates loading and unloading

Low-Voltage Controllers Have Draw-Out Air Circuit Breakers

General Electric Co., Schenectady 5, N. Y., offers a line of low-voltage controllers with draw-out air circuit breakers. The controllers are for use with ac. motors up to 800 hp., and for dc. motors up to 350 hp. The metal-inclosed controllers are designed for controlling squirrel-cage, wound-rotor, synchronous, or multi-speed ac. motors or dc. motors. Common applications are pumps, mixers, grinders, and similar devices.



THE JOB:
Finishing distributor drive gear. .004" to be removed on chordal thickness at ends, and .002" near center of teeth.

TOLERANCES:
Plus or minus .0005".

MACHINES USED:
Michigan Rotary Underpass Finishers.

PRODUCTION:
45 seconds per gear, floor to floor, per machine. 240 gears per man hour (operating 3 machines).

GEARS INTEGRAL WITH SHAFTS:

Finish them faster and more accurately on a Michigan Underpass

For instance, those distributor shaft drive gears on camshafts. There is no reason why you cannot make them just as quiet just as quickly as other gears shaved on Michigan gear finishers.

One company is finishing such camshaft gears in less than 45 seconds each . . . floor to floor . . . *and that's fast!* What's more, the machines are so easily operated that one man can run three of them, if you should need that much production. Or, he can run a Shear-Speed, cutting another gear, in addition to the "870" underpass shaver.

About the only difference between a camshaft gear shaving machine and a standard "870" is a somewhat longer headslide to accommodate the longer shaft, plus a couple of steady rests to support the camshaft at the bearings close to the gear being finished.

For complete information ask for Bulletin 870F

ORIGINATORS of GEAR SHAVING

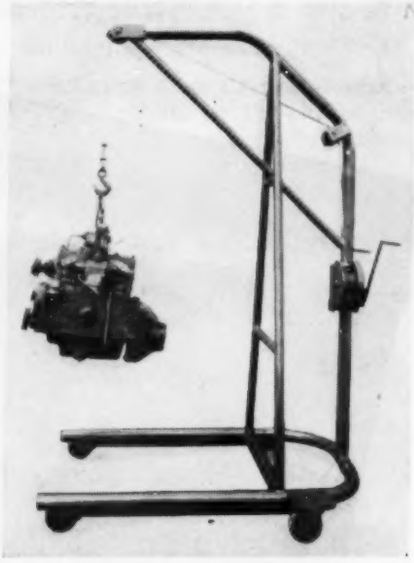
MICHIGAN TOOL COMPANY
7171 E. McNICHOLS ROAD DETROIT 12, U. S. A.

Profilometer Applimeter Tracer For Measuring Surface Roughness

A tracer for use with Profilometer Amplimeters in taking surface roughness measurements on hard-to-reach surfaces is offered by Physicists Research Co., 321 S. Main St., Ann Arbor, Mich. Listed as Type GB tracer, the unit provides for measuring in internal grooves and slots, tracing axially in small holes, tracing both transversely and longitudinally in narrow slots and grooves and on gear teeth, and tracing on internal and external tapered surfaces.

The tracing point is located at the end of a narrow beam which projects horizontally from the bottom of the tracer. The tracer measures all flats and OD's, and has an internal range of 5/64-in. holes or 1/16-in. slots to a deph of ¼ in., in 7/64-in. holes or 3/32-in. slots to ¾-in. depth, and on gear teeth as small as 18 pitch.

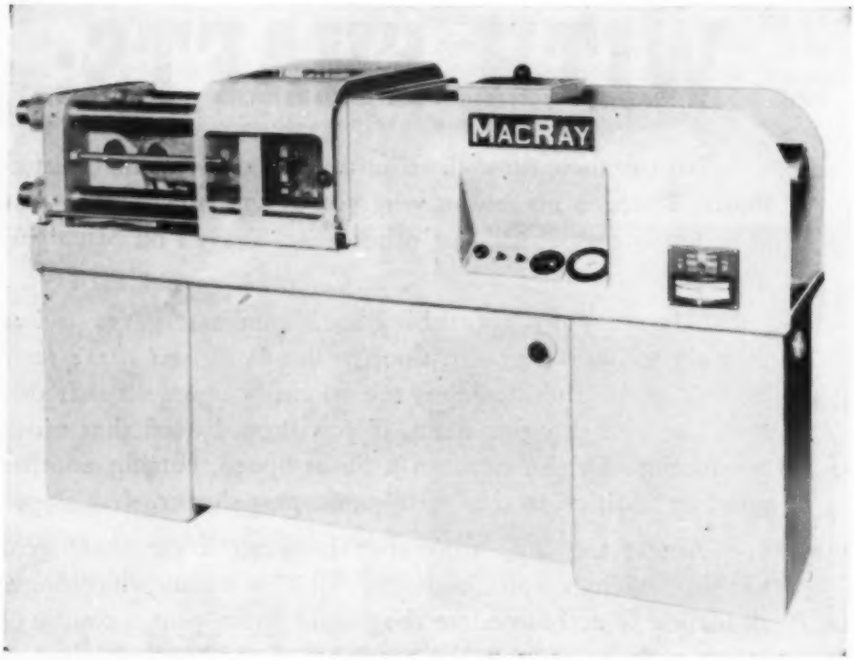
BOX-TYPE HAND TRUCK of all-steel construction for handling light parts is made by Palmer-Shile Co., 16019 Fullerton Ave., Detroit 27, Mich. The truck features four pneumatic tires, the two larger stationary. Maneuverability and operating conveniences are added by two pivot wheels at the pushing end



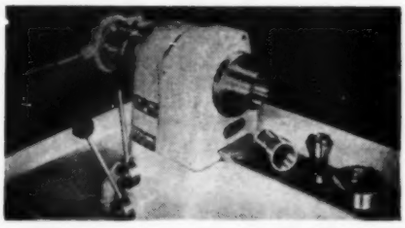
Grand Portable Shop Cranes Are Offered in Three Models

The Grand Specialties Co., 3135 W. Grand Ave., Chicago 22, Ill., offers portable shop cranes available in three models. The No. 1-C with a lift up to 7 ft., and the No. 2-C with a maximum lift of 10 ft. 8 in. is guaranteed for 400-lb. lift.

The No. 1-C weighs 350 lb. The No. 2-C weighs 365 lb., and the No. 7-C, 480 lb. The safety winch crank is turned in clockwise direction to lift the load. When operator stops the load is held firmly. The winch is of sufficient strength to carry the maximum load on a single cable line with one man at the crank. On the Model 7-C, the boom can be extended to 79 in., when folded down it is 48 in. from the ground.

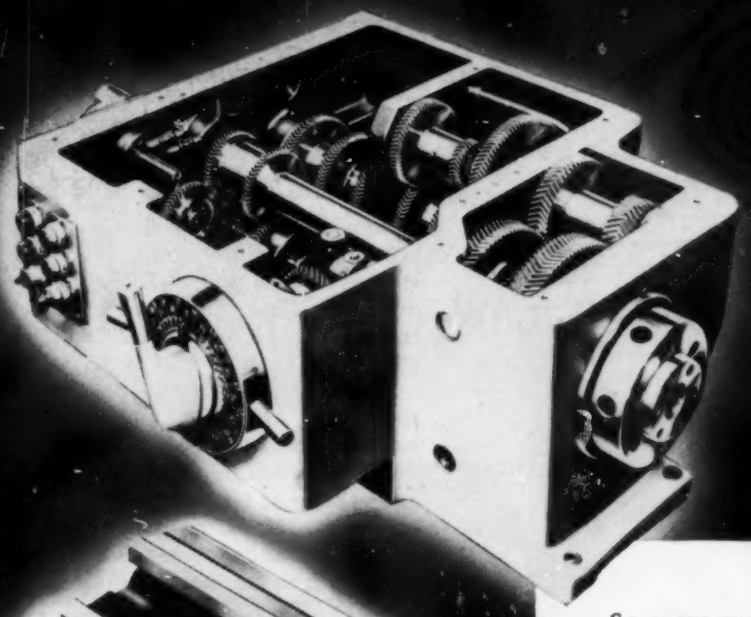


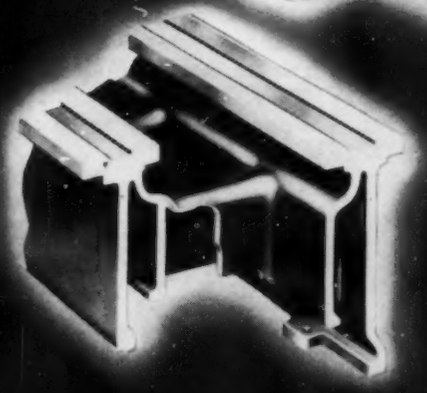
INJECTION MOLDING MACHINE made by MacRay Engineering Co., Cleveland 3, Ohio, is rated at 3-oz. capacity. The bed is not a stress member since the rated 75-ton clamping pressure is taken in the four, 3-in. dia. strain rods. The injection load resulting from the 13,900-psi. maximum pressure on the material is absorbed in the two injection strain rods. Molds 12x15 in. with a 12-in. max. thickness can be set up in the machine. Two half bands of electrical resistance, totaling 3400 watts provide the heat necessary for plasticizing 25 lb. of material per hr.



SECOND-OPERATION MACHINE is offered by Hardinge Brothers, Inc., Elmira, N. Y. The high-speed precision second-operation machine offers a stationary-style collet. The model is known as VBS and combines all the features of their standard model DSM59 with the addition of the stationary-collet feature. The collet feature is offered for maintaining close tolerances on length or shoulder specifications. The preloaded ball-bearing center-drive headstock spindle offers 1-in. round, ⅞-in. hexagon, and ¾-in. square collet capacity. Eight spindle speeds are available in either forward or reverse from 230 to 3500 rpm.

When the job calls for PRECISION put it on a– SIDNEY LATHE

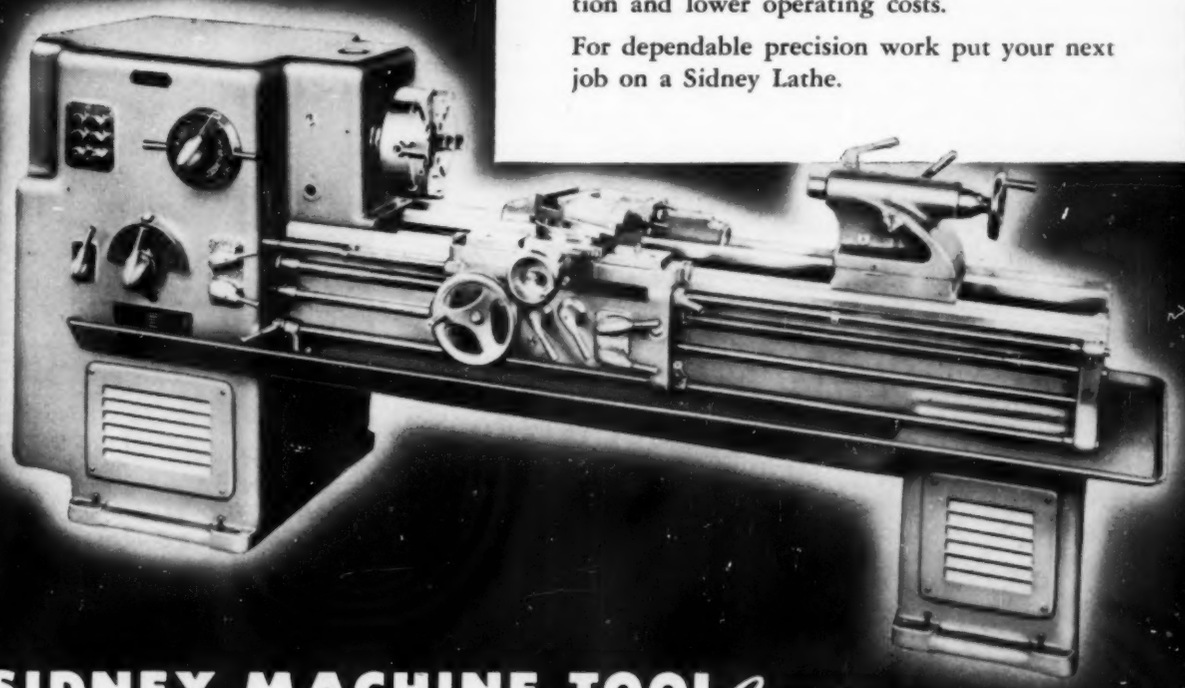




So as we review the past year we find an ever increasing interest in Sidney Lathes.

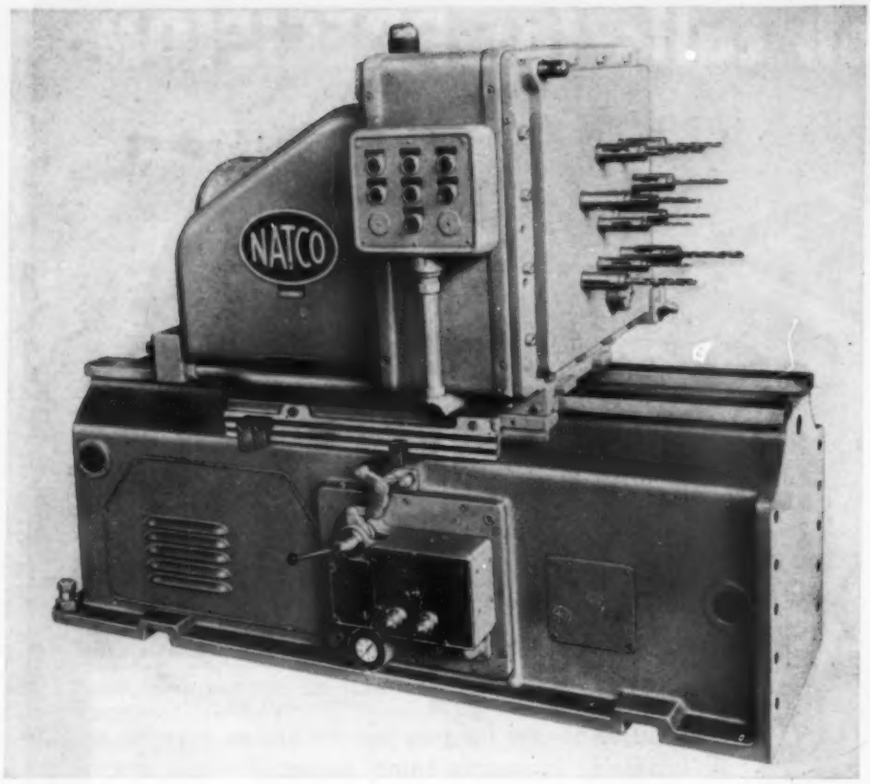
Why? because of the improved design–rigidity of construction from base to headstock–the smooth flow of continuous power from the herringbone geared head, the ideal drive when using carbide tools–spindle mounting which automatically compensates for expansion caused by temperature rise–and numerous other design and construction features which result in continued accuracy, greater production and lower operating costs.

For dependable precision work put your next job on a Sidney Lathe.



SIDNEY MACHINE TOOL *Company*

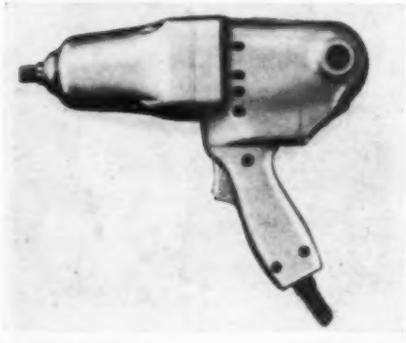
BUILDERS OF PRECISION MACHINERY SINCE 1904 — SIDNEY, OHIO



Natco Holesteel Floor-Type Units For Constructing Way-Type Machines

The National Automatic Tool Co., Richmond, Ind., offers the Model C2FT, C3FT, illustrated, and C4FT Holesteel floor-type units for constructing way-type machines. The machines are used for drilling, boring, tapping and similar operations. They are arranged with standard single-spindle heads, fixed-center multi-spindle heads, or adjustable multiple-spindle heads complete with other standard adjustable spindles or slip-spindle plates and spindles.

The electrically controlled hydraulic feed system provides an infinitely variable feed selection within specified range. The slide power cylinder is mounted between the ways and through a control system provides a cycle sequence of rapid advance, coarse feed, fine feed, rapid reverse and stop. A delayed reverse can be furnished if desired. Also available is a step-drilling attachment for deep holes, with an automatic cycle.



Portable Electric Impact Wrench Tightens, Removes Nuts, Bolts

Black and Decker Mfg. Co., Towson 4, Md., offers a ⅜-in. impact wrench. The portable electric wrench will tighten or remove either left- or right-handed nut bolts and cap screws. The range of this tool is rated at ⅜-in. thread diameter.

It spins a free-running nut or bolt to a seating position with high-speed, direct-drive action, then within a matter of seconds a rapid, rotary hammering action drives the nut or bolt to maximum tightness.

The wrench has a side handle with automatic release switch, reversing switch, and a three-conductor cable and plug. The wrench can be had with six hexagon sockets ranging from 9/16 to 15/16 in. A reversing switch allows either driving or removing fasteners.

Tension Unit for Web Processing Operates from 60 to 3200 fpm.

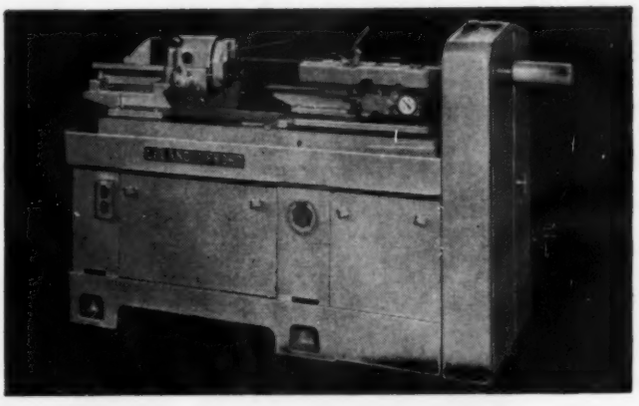
A tension unit for web processing providing constant tension and constant velocity on a web of paper during printing, is offered by Black Industries, 1400 East 222nd St., Cleveland, Ohio.

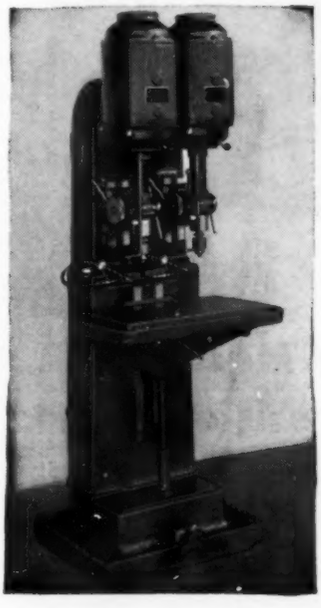
Similar machines can be used in the paper, textile, plastic, leather, and rubber industries and in the metal fabricating field employing coiled strip of ferrous or non-ferrous materials. Machines will maintain constant tension over a wide range from a few ounces to hundreds of pounds. They have been built to operate at speeds as low as 60 and as high as 3200 fpm.

ALL-STEEL STRAIGHT-SIDE PRESS offered by Niagara Machine and Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y., is a double-crank single-gear tie-rod frame press, having a rated capacity near bottom of stroke of 185 tons. The machine illustrated is typical of the line offered. With both single- and double-geared machines, the high-speed shaft and flywheel with electro-pneumatic clutch is mounted on the machine within the crown above the crankshaft

THE LELAND GIFFORD LINE

includes a drilling machine
to meet your every need.
Individually motored spindles
Speeds instantly selected
Wide speed ranges





NO. 1 SUPER HIGH SPEED

NO. 2 TO CAPACITY OF NO. 2 M.T.

NO. 3 TO CAPACITY OF NO. 3 M.T.

NO. 4 FOR HEAVY DUTY

. . .

VERTICAL AND HORIZONTAL

DEEP HOLE DRILLING MACHINES

16 SPINDLE ADJUSTABLE

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

SELF-CONTAINED AUTOMATIC FILTER-CLEANER UNIT for use in connection with its standard model 1150 Dustkop dust collectors, is offered by Aget-Detroit Co., 387 Main at Washington, Ann Arbor, Mich. The automatic self-cleaner removes lint by suction from the inner surface of the filter and sends it through the cyclone where the lint fibers are taken out of the air stream. The mechanism consists of a semicircular filter of nonflammable spun glass and a motor-driven nozzle which is inclosed within the assembly to reciprocate continuously over the inner surface of the filter

Eutectic High-Silver Alloy For Stainless Steel, Copper

A high-silver alloy is offered by Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. Listed as Eutecrod 1700, it is designed for stainless steel, copper, brass, bronze, tungsten carbide and steel. It is said to be a thin-flowing high-silver alloy, is claimed to give a good color match to stainless steel, and is recommended for making lap, square, butt and T-joints as well as for sealing and filling small cracks and defects. Eutecrod 1700 bonds at 1020-1250 F., and has a tensile strength of 64,000-68,000 psi. It is available in 3/32-, 1/16-, 3/64-, 1/32-, and 1/64-in. dia.

Gairing Heavy-Duty E-Con-O-Mill Designed for Roughing Operations

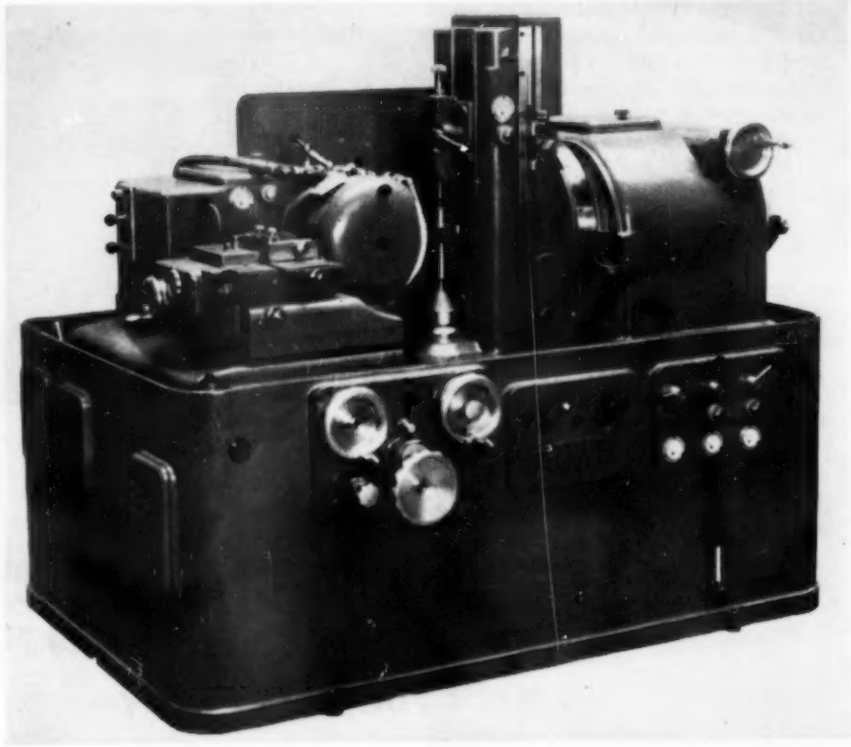
The Gairing Tool Co., Detroit, Mich., offers a heavy-duty model of the E-Con-O-Mill line of standard face mills. Designed for roughing operations where the greatest wear occurs along the periphery of the tool, blades are set at an angle to allow greatest adjustment in a radial direction. Extra heavy cutter bodies are made 8 in. in diameter and over. Blades are of three types for cutting steel, cast iron, and non-ferrous materials, and come finish ground ready for work.

2-oz. Plastics Injection Press For Vertical, Horizontal Work

A universal all-hydraulic Minijector plastic injection molding machine is offered by Moslo Machinery Co., 2443 Prospect Ave., Cleveland 15, Ohio. The machine is arranged for manual operation as well as semi-automatic operation. It can be furnished for the molding of nylon or vinyl as well as the complete range of thermoplastic materials.

A 3-way heat nozzle heater is furnished on the nylon unit, and can be furnished as optional equipment on standard machines. The Moslo universal Minijector features a newly developed mold assembly that swings through a 90° arc to permit operation at any angle from horizontal to vertical position, utilizing a simplified mold-clamping arrangement.

Capacity of the hydraulic pump is 7 gpm. Mold size is 8x9 in., mold thickness, 6 in., mold opening, 6 in. Injection plunger is 1½ in. in diameter and the stroke is 7 in.



Reishauer Gear-Grinding Machine For High-Production Precision Work

The Reishauer gear-grinding machine, Type ZA, manufactured by Reishauer, Zurich, Switzerland, is offered by Cosa Corp., Chrysler Bldg., 405 Lexington Ave., New York 17, N. Y. The machine will grind high-precision gears for high production.

A single thread-grinding worm with rack profile can generate the theoretical shape of the tooth by means of an infinite number of enveloping cuts. The machine is suitable to grind spur gears and helical gears up to a diameter of 9½ in. and a pitch of up to DP 6. Pitches below DP 32 can be ground from the solid blanks because of machine's capacity.

The grinding process is continuous and not interrupted by a dividing operation. The machine works automatically to the finished dimensions within close tolerances. The horizontally arranged grinding slide performs the wheel feed movement and carries the attachment for profiling and grinding work. The vertically adjustable workslide guides the rotating workpiece carried between two centers past the grinding worm.

The vertical slide can be swiveled in both directions up to an angle of 45° maximum.

NOW for the First Time...

A SIT DOWN RIDING TYPE STACKER

It's the Transrider!

Everyone knows the famous Automatic TRANSTACKER . . . the high lift stacker that moves, lifts and stacks material with "touch of your thumb" ease.

Now, for the first time, you get all the benefits of this miracle truck, but with the added advantage that you now can RIDE it. Operator sits comfortably on the TRANSRIDER . . . does your material handling with utter ease, lifting, tilting and driving simultaneously.

Its batteries are interchangeable with the Transporter Motorized Hand Truck Series, and no new charging equipment is necessary.

With a telescopic lift mechanism, the Transrider raises load to 130 inches, with an overall height of only 83 inches for clearance through standard boxcar and factory doors. Single lift, before telescopic uprights are extended, is 66 inches.

The shortest of any truck of like capacity, Transrider is maneuverable in cramped working quarters. Carrying a 36-inch load, it can right-angle stack in nine-foot aisles. This means added storage space within present building capacities. Truck capacities range from 2000 pounds for 48-inch long load to 3000 pounds for a 28-inch load.

At Transrider's new, low cost, every business now can use modern, money-saving material handling methods! Mail coupon for complete facts.

NOTHING LIKE IT FOR LOW COST MATERIAL HANDLING

Tilting Type TRANSTACKER

This is the famous Transtacker you walk with . . . and now made even more efficient with new tilting uprights that cradle the load for easier, faster spotting of loads, and maximum protection for both operator and merchandise.

High pressure hydraulic single or telescopic lift stacks your product to new heights, to increase storage capacity. Finger-tip control lifts a 36-inch, 2500-pound load, or a 48-inch, 2000-pound load in a matter of seconds. Transtacker also operates on standard batteries, and chargers, interchangeable with the Automatic Transporter. Mail coupon.

3rd ★★★★ NATIONAL MATERIALS HANDLING EXPOSITION
PHILADELPHIA CONVENTION HALL JAN. 10-14 1949

Transrider Stacker
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
DIV. OF THE YALE & TOWNE MFG. CO.
59 West 87th Street, Dept. X-8, Chicago 20, Ill.

Please send me catalog and complete facts on the new, low-priced
☐ TRANSRIDER
☐ TILTING TYPE TRANSTACKER

Company Name.....
By.....*Position*.....
Street Address.....
City.....*Zone*.....*State*.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

Dry Powder Extinguisher In 20-, 30-lb. Capacities

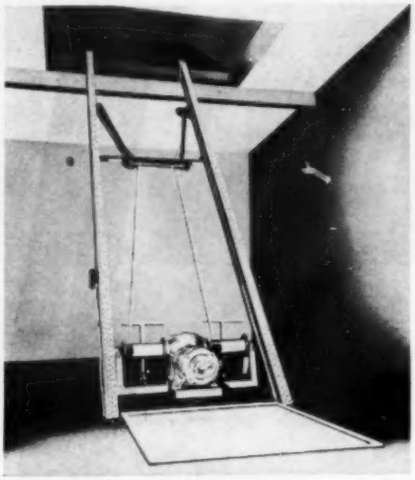
A dry chemical powder extinguisher designed for use against flammable liquid and electrical fires in industrial plants, is offered by Walter Kidde & Co., 40 E. 34th St., New York 16. N. Y. The extinguisher, made in 20- and 30-lb. capacities, contains a special dry powder mixture that will not pack or obstruct discharge.

One-hand operation with trigger-finger control is combined with overall light weight construction. When the lock pin in the handle is removed and the trigger is pulled, the powder chamber is immediately pressurized by carbon dioxide released from the small cylinder mounted on the side. Simultaneously the powder release valve in the top of the main powder chamber opens, discharging fine powder through the hose and nozzle in a stream that carries about 20 ft. or more.

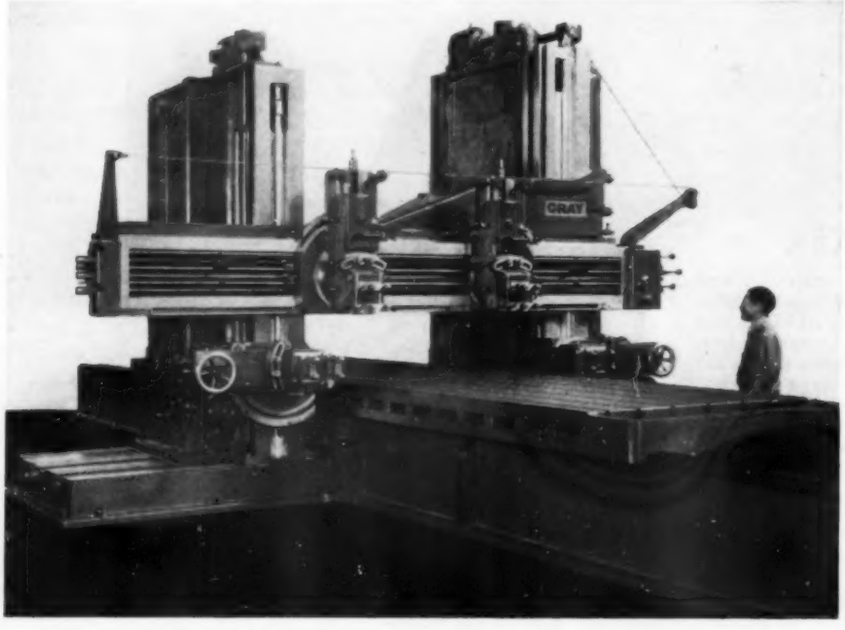
Small Air-Chipping Hammer Offers a Jet-Blower Device

A small air-chipping hammer is offered by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y. A jet-blower device is incorporated in the hammer. It is a positive air jet which cleans off a work surface as though a blow gun were built into the tool. A pulley valve design provides a smooth throttle action.

The tool can be used for the chipping of rust, scale, weld flux, soot, paint, and dirt, and can also be used for cutting old windings in electrical motor-repair shops. The tool weighs over 4 lb., is about 10 in. long, and is priced at $50.00.



AUTOMATIC STAIRWAY LIFT made by the Moto-Flow Co., Bay City, Mich., is called the Stair Levayor. The Stair Levayor handles materials between different floor levels. It is adjustable for width, length and pitch of stairway, and can also be used as a lift over present wood or concrete stairway or in any open space with or without steel treads inside or out. Pushbutton controls at every floor levels eliminate need of a trained operator. The safety factor is 5 to 1, plus 45° angle stress to reduce load weight by one-half



CONVERTIBLE OPENSIDE PLANER, is introduced by The G. A. Gray Co., 3601 Woodburn Ave., Cincinnati, Ohio. Manual or power in-and-out adjustment of the outboard housing provides effective utilization of the left-hand side head. Jobs of unusual width can be accommodated by a self-contained rapid-traverse system and its feed and automatic tool-lifter mechanisms are connected with the main system. Planers have table speeds up to 300 fpm.

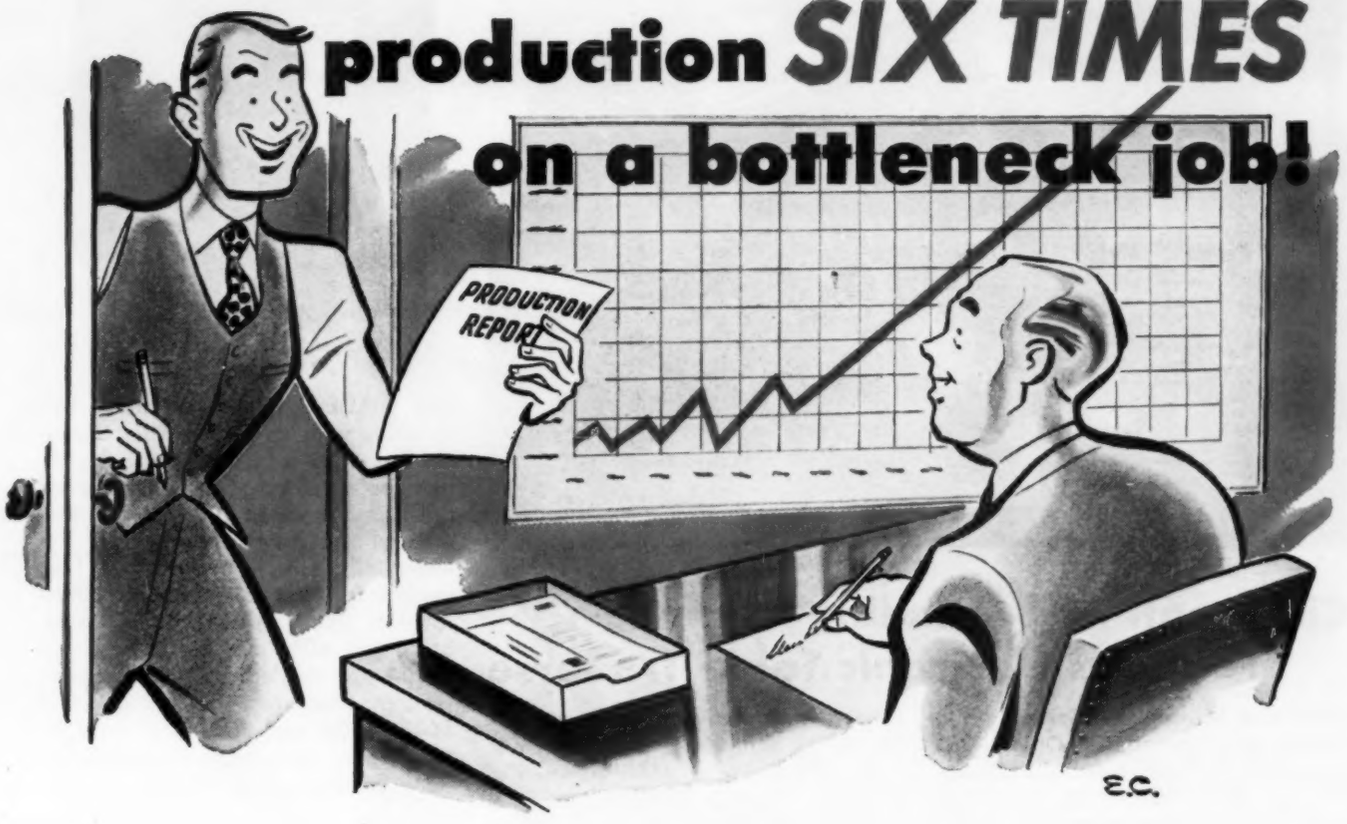
Hickok 5-in. Oscilloscope Has Sensitivity to 15 mv.

A 5-in. oscilloscope is offered for industrial and laboratory use by Hickok Electrical Instrument Co., 10692 Dupont Ave., Cleveland 8, Ohio. Listed as the Model 195B, it has high gain amplifiers, sensitive to 0.015 v. (15 mv.) per in.—30 cycles to 1 mc.

Self-Contained Wet-Cutting System Offered for Horizontal Band Saw

A self-contained wet-cutting system is available for the Wells No. 5 Utility Model horizontal metal-cutting band saw. Developed by Wells Mfg. Corp., Three Rivers, Mich., it is similar to those which have been used on the Wells Models No. 8 and 12. Portability of the machine is retained, inasmuch as full area chip pan is mounted firmly between the bed and legs.

This manufacturer raised production SIX TIMES on a bottleneck job!



To be sure you are getting everything you should from carbides; why not let our carbide specialist work with you, too?

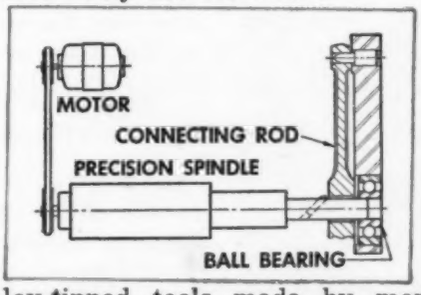
WITHOUT doubt, a Carboloy tool was best for boring these forged steel connecting rods.

Yet the tool was boring only nine pieces per tool grind. Why so few? Because the crank bearing cap was a separate part—the cut was interrupted—stock in the hole was very uneven. These conditions made the job more difficult.

So a man with carbide experience was called in—*a Carboloy engineer.* After a careful check and some experimenting, he found that the carbide boring tool was all right, but the setup was not sufficiently rigid. So he suggested a piloted boring bar. When a temporary piloted boring bar was installed, *the number of pieces per grind* bored by the Carboloy Cemented Carbide tool was raised *from nine to fifty*—due in great measure to the ability of carbides to work at higher speeds. A permanent bar is expected to *double* production again!

Call in *your* Carboloy engineer

A Carboloy engineer's carbide experience may help you with any such problem. His services are free—why not use them?



Let him assist with your special problems—and help you select the most economical tooling from more than 600 standard Carboloy tools and blanks, or special Carboloy-tipped tools made by more than 150 tool manufacturers.

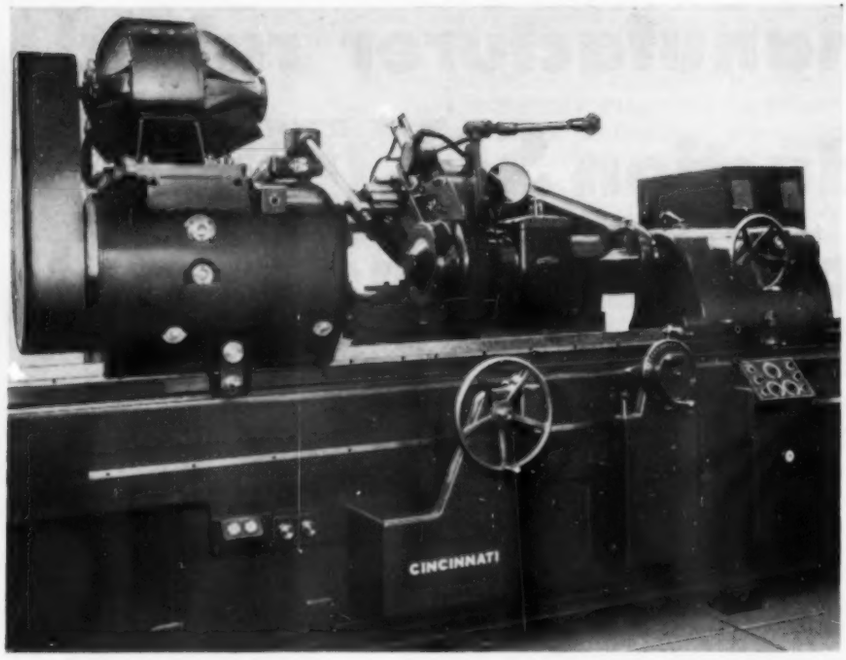
Contact your Carboloy engineer today—or write us direct:

CARBOLOY COMPANY, INC.
11149 E. Eight Mile Street, Detroit 32, Michigan

AUTHORIZED CARBOLOY CEMENTED CARBIDES DISTRIBUTORS

Standards stocked by authorized distributors in 83 cities coast to coast.

CARBOLOY®
CEMENTED CARBIDE



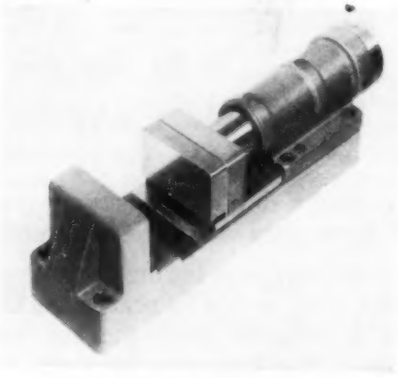
Cincinnati Roll-Grinding Machine Features Electronic Table Traverse

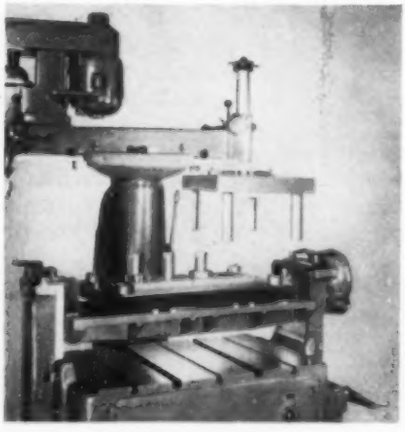
Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio, offers the improved Cincinnati Filmatic 20-, 24-, and 28-in. heavy-duty traveling-table roll-grinding machine. Electronic table traverse provides an infinite number of traverse rates, and is said to improve accuracy of reversal.

Automatic wheel balancing eliminates the human element and is said to require only a few seconds. The machines are available in three swing sizes, 20, 24, and 28 in., each in five between-center lengths, 8, 10, 12, 14 and 16 ft. The electronic controls provide an infinite range of traverse rates from 3 to 120 ipm.

Tarry at each end of the table stroke can be independently adjusted over a range of about 20 sec. Camber or crown on the rolls is obtained through a tilting wheelhead cambering unit. The wheel truing unit is hydraulically powered and arranged for cam-controlled profile truing. Cams can be selected to suit the camber being ground.

AC. WELDERS with ratings from 100 to 2000 amp., are offered by Glenn-Roberts Co. Inc., 2107 Adams St., Indianapolis 18, Ind. Four utility models are NEMA-rated at 100, 150 and 200 amp. at 30 volts, 50% duty cycle. The industrial welder line includes four models for manual welding NEMA-rated at 200, 300, 400, and 500 amp. at 40 volt, 60% duty cycle; 750- and 1000-amp. single-transformer models for automatic-head welding, and 1000-, 1500- and 2000-amp. multiple-transformer models for combination manual-automatic use





Moore Die Flipper Can Turn Over Die Set 20x40x12-in. Shut Height

The Moore die flipper is offered by Moore Special Tool Co. Inc., Bridgeport, Conn. The die flipper will take apart and turn over a die set 20x40x12-in. shut height, pins engaged in bushings 4 in. In addition one diemaker can drill, tap, and try out, the punchholder and die shoe always being clamped securely to the machine.

The rear lifting device located on the arm of the radial drill opposite the spindle makes possible the mechanical removal of the die bed or punchholder and if desirable, the placing of either member on a rolling truck while work is being conducted on the other. A 3-in. shank adapter is available to pull punchholder and die bed apart.

The die flipper also makes possible the counterboring for heads of screws tapped into the punch flange. The ¾-in. drill chuck with a long shank is now available for this purpose. Capacity of the radial drill has been increased from 1¼ to 1½ in. with speeds of 200 to 1200 rpm.

Standardized Punching Units Have Interchangeable Cylinders

A line of standardized hydraulic punching units with cylinders interchangeable on different bases is announced by Progressive Welder Co., 3050 E. Outer Drive, Detroit 34, Mich. The units can be used for almost every production job involving punching, shearing, notching, trimming, or forming.

They are available in 8 different types of base mountings—closed end, open end, floating type, rocker type, front- or rear-end flange mount, open-end two-guide-pin type, and open-end three-guide-pin type. They are standard in 2-, 3-, 4-, 5-, and 6-in. dia., and stroke lengths of 1, 2, 3, 4, 5, and 6 in.

HYSTER KARRY KRANE

See all Hyster models at the NATIONAL MATERIALS HANDLING SHOW, Philadelphia Convention Hall, Jan. 10-14, 1949

ABOVE: Two of a fleet of 35 Karry Kranes used by a public utility company for yard and field work. BELOW: Furniture manufacturer cuts car loading costs 2/3 with Karry Krane.

Lowest Priced...Most Productive ...Fastest Moving Self-Propelled 5 Ton Mobile Crane on the Market!

You won't believe it until you see a Karry Krane performing your loading and unloading jobs under your own conditions. That's why we welcome an opportunity to demonstrate this self-propelled mobile crane with adjustable boom, pneumatic tires, and the ability to hoist and move heavy or bulky loads up to 10,000 pounds quickly and efficiently.

See your Hyster distributor for a Karry Krane demonstration. Write for literature.

HYSTER COMPANY

THREE FACTORIES

2902-14 N. E. CLACKAMAS STREET, PORTLAND 8, OREGON
1802-14 NORTH ADAMS STREET ..... PEORIA 1, ILLINOIS
1010-14 MEYERS STREET ..... DANVILLE, ILLINOIS

Productively Generate

SURFACE FLATNESS

MICROFLAT MACHINES

This cast iron valve plate for a refrigeration unit is finished on a double surface Microflat Machine to 8-microinch r.m.s. finish—optically flat and both sides parallel within 0.0001-inch. Production rate is 20 pieces per minute.

FINISH flat surfaces, on any material from soft copper to quartz or nitralloy, regardless of the shape or size of the part, in high production. Opposite sides of one or many parts are finished simultaneously on double surface machines,—productively produced to one light band of flatness and within one microinch r.m.s. surface finish. Recessed surfaces may also be finished on single surface machines.

Let us send more information at your request.

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE, DETROIT 4, MICHIGAN

DISTRICT FIELD OFFICES:

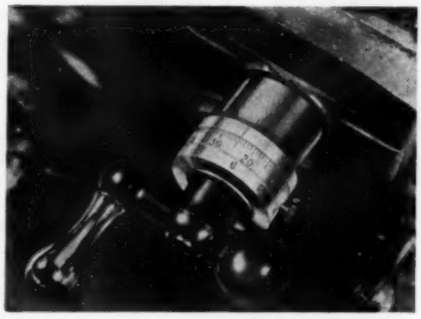
1323 S. Santa Fe, Los Angeles 21, California
616 Empire Bldg., 206 S. Main St., Rockford, Ill.
55 George St., Brantford, Ont., Canada
Micromold Manufacturing Div., Boston Post Road, Guilford, Conn.

Dravo Small Crane Cab Cooler Operates in Plants to 130 F.

A small air-conditioning unit for crane cabs, has been developed by Dravo Corp., Fifth and Liberty Avenues, Pittsburgh 22, Pa. Designed for factories where materials such as aluminum, copper, lead, manganese, and magnesium are handled, the unit is about half the size of the crane cab cooler designed for use in steel mills.

The new unit will operate in plant temperatures up to 130 F. It maintains cab temperatures at 80 to 85 F. in summer, and 68 to 72 F. in winter.

Filters remove dirt and dust from the air and activated carbon canisters remove fumes, gases and irritants. Electric strip heaters provide winter heating. Air is used for condensing purposes in coils.



Revodex Direct-Reading Dial For Lathes, Milling Machines

A direct-reading dial for use on all small- and medium-sized lathes, milling machines and other machine tools, is offered by Van Dyke Instruments, Inc., 1401 Airway Drive, Glendale, Calif.

Called the Revodex dial, it consists of two intergeared dials, the first reading in 0.001 in. and the second reading in 0.1 in., and indicating the actual number of revolutions of the first dial. In use, it relieves the operator from mentally adding the number of complete revolutions and eliminates the necessity of frequent micrometer checks. The dial is adaptable to all shaft diameters from ¼ to 11/16 in.

Type CT Clarifier by W.G.B. Has a Multiple-Purpose Filter

The W.G.B. Oil Clarifier, Inc., Kingston, N. Y., offers the CT clarifier employing a replaceable filter cartridge which can be changed without the use of tools. The multiple-purpose filter is an outside-to-center filter covering an area of practically

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

You know more about advertising than you think !

IF YOU UNDERSTAND the basic principles of mass production —

If you're on familiar ground when it comes to time-motion studies, obsolescence curves, and assembly-line techniques —

If you regard every operation in your plant as a challenge to further reduce your manufacturing cost-per-unit —

Then you know a lot more about advertising than you think. Yes, *advertising!*

For basically, advertising is the application of assembly-line techniques to the *manufacture of a sale.* And how are sales manufactured? Like any other commodity, by sequence of "processing operations." In this case they include —

1. Seeking out prospects
2. Arousing their interest
3. Creating a preference for your product
4. Making a specific proposal
5. Closing the order

Couldn't your salesmen handle this entire sequence? Certainly — if you had *enough* salesmen, and weren't concerned about the cost. But no salesman should *have* to spend his valuable time on missionary work. Not when those first three steps can be *mechanized* for him — not when they can be handled so much more economically — through the efficient use of business paper advertising.

Why *business* papers? Because nowhere does your advertising work more efficiently than in the business publications which reach your best prospects. Nowhere else can "mechanized selling" contribute so much toward reducing the cost of manufacturing a sale!

American Machinist

is a member of The Associated Business Papers, who have published an interesting folder entitled, "10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

30% Savings thru Simplified Control of Production, W-I-P, Costs, Payroll and Materials

Savings thru "McCaskey Simplification" are again demonstrated — this time by twenty-five years of service in the plant of Mathias Klein and Sons, Chicago, Ill.

Their McCaskey System provides control of work-in-process by operations, perpetual inventory of raw materials and sub-assemblies, payroll records and distributions and operation costs. The status and progress of hundreds of jobs involving from three to fifty operations each are constantly available at a glance.

About eight months after the system was originally installed, Mr. J. A. Klein, Jr., then Superintendent and now President, commented that their McCaskey System had reduced time and clerical work 30%, provided control that was more accurate than the posted records replaced and made available complete monthly analyses approximately two weeks earlier than before.

What was true then is true today, and their requirements have increased both in size and the complexity that results from present operating conditions. Changes in detail have been made to meet the expanded needs of the organization, but the basic principles of "One-Writing and Visible-Filing" have not been altered.

McCaskey Controls and multiple-copy forms are used in hundreds of plants to simplify procedures and provide prompt, accurate data. Write for a demonstration and suggested applications to your requirements . . . or descriptive folders. *No obligation.*

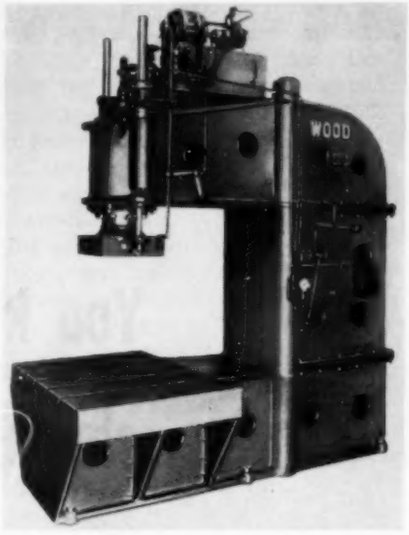
McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

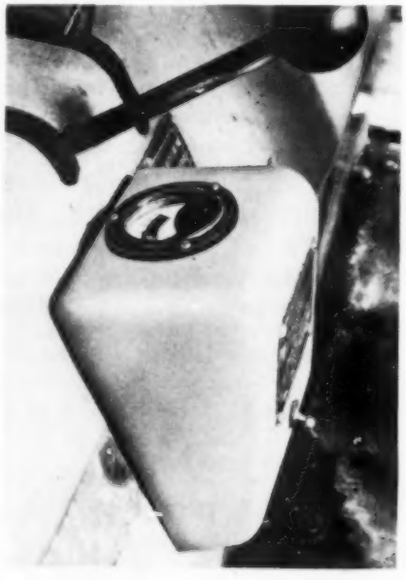
McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

272 sq. in. when used with Lube oil and 238 sq. in. when fuel cartridges are used.



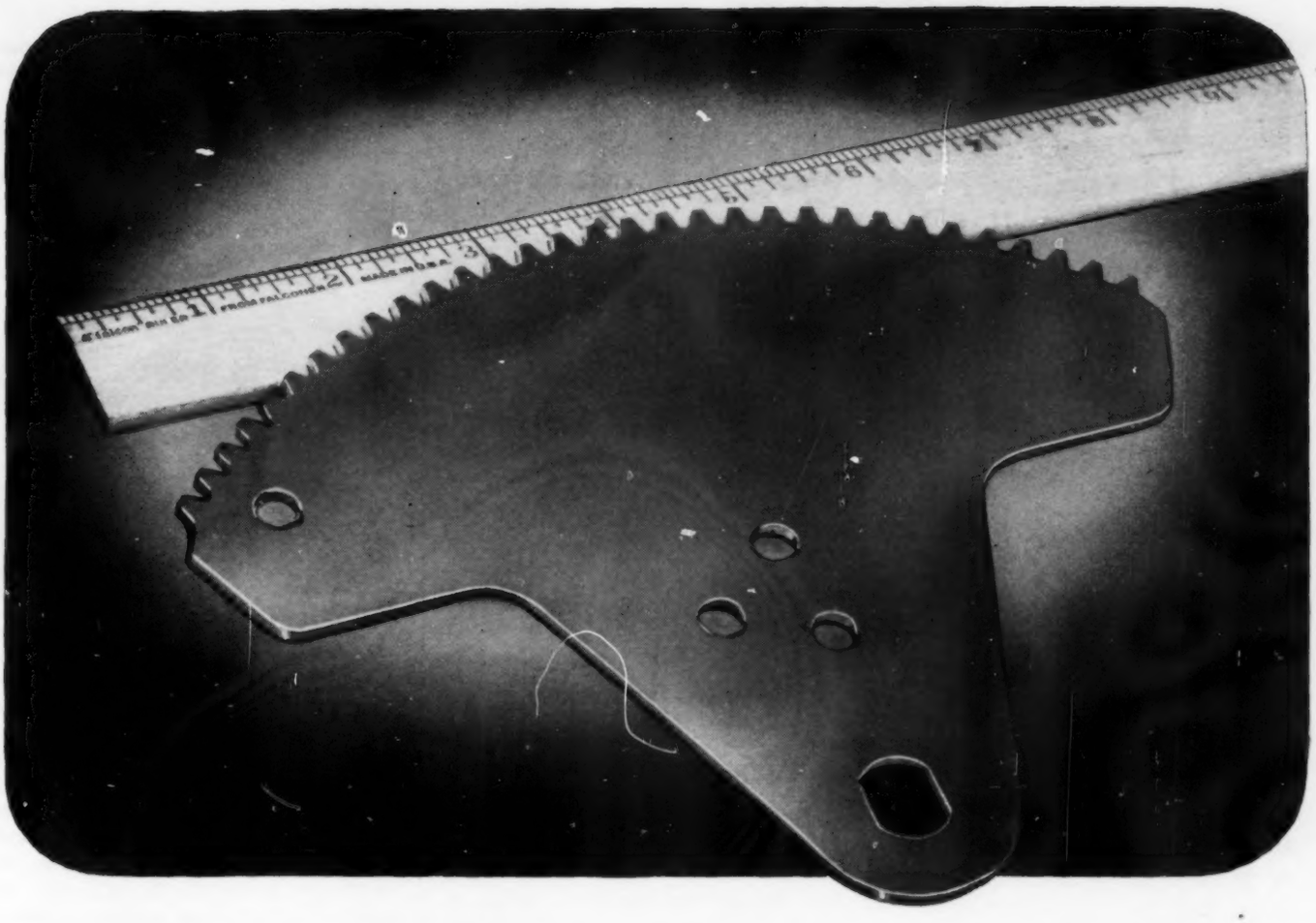
HydroLectric Open-Gap Press Features a 250-ton Capacity

The R. D. Wood Co., c/o Harris D. McKinley Organization, 12 South 12th St., Philadelphia 7, Pa., offers an open-gap press, the HydroLectric 250-ton open-gap type, self-contained press, used in flanging, bending or straightening operations. Sizes of the table and ram head are 30x30 in. and 8x6 in. respectively. Operating hydraulic pressure is supplied by a 2000-psi., two-stage rotary-vane type pump displacing 17.7 gpm.

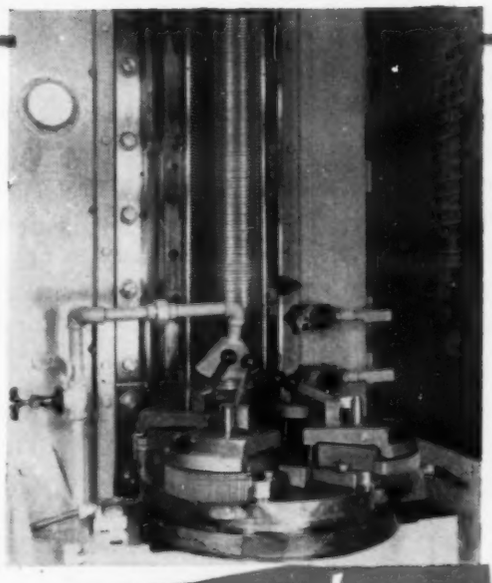


Gould Battery Charge Indicator Gives Momentary Charge Condition

A charge indicator which gives momentary charge condition of the battery and keeps the operator informed



Windows will open *easier* in 1949



● Yes, that's the gear segment from the window regulator in your car — made by one of the leading auto body plants in the country.

New cars next year will have an unseen technique-broaching that will make car windows easier to open — and this Lapointe broaching not only gives the segment added precision for easier window opening, it also adds to the manufacturer's production. Eight segments at a pass in a special full automatic four-station fixture is now recommended procedure for these simple gear segments. Perhaps you have a problem in metal removing where added precision, greater production would mean more profits to you. Why not consult Lapointe?

HUDSON LAPOINTE MASS.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

Electrolized BROACHES EXCLUSIVE With LAPOINTE!

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

His Signature-- Your Alloy Protection

This Ryerson alloy inspector's signature completes a triple play for your protection—spark tester to laboratory metallurgist to inspector.

First the spark tester checks the spark pattern to verify the steel's analysis. Then the metallurgist tests it for hardenability in the Ryerson laboratory. Finally, the inspector checks the steel when ready for shipment and certifies with his signature that its type, size, finish, condition, color marking and heat identification exactly meet specifications of the order.

The inspector's signature also means that the Ryerson Alloy Certificate sent with the steel correctly charts hardenability for the particular bars shipped. This Certificate proves that the steel will meet performance requirements — enabling you to buy on the basis of hardenability with complete safety. Heat treating? The Certificate guides you to quick, accurate results.

While we may be temporarily short of some sizes, thousands of tons of Ryerson alloy steels await your call—triple-checked for quality. Just contact your nearby Ryerson plant.

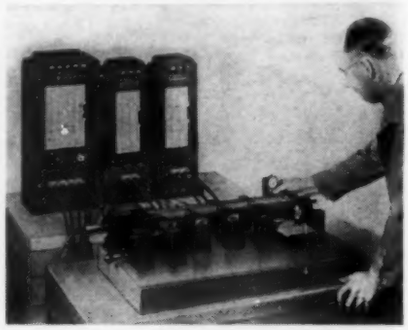
Principal Products

BARS — Carbon and alloy, hot rolled and cold fin., reinforcing
STRUCTURALS — Channels, angles, beams, etc.
TUBING—Seamless and welded, mechanical and boiler tubes
STAINLESS — Allegheny metal plates, sheets, bars, etc.
PLATES—Sheared and U.M., Inland 4-Way Floor Plate
SHEETS—Hot and cold rolled, many types and coatings
MACHINERY & TOOLS—for metal working

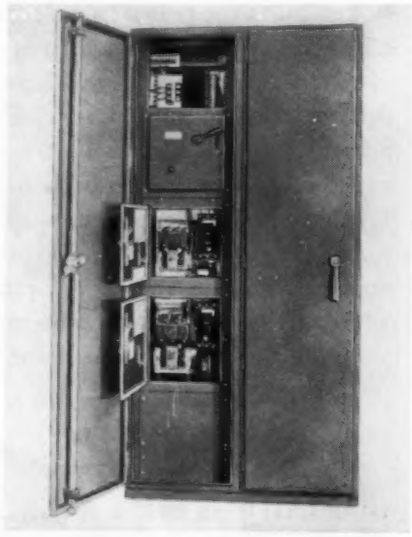
Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco

RYERSON STEEL

as to its state of charge throughout the shift is introduced by the Gould Storage Battery Corporation, Trenton, N. J. Designed for use with industrial trucks, the dash-board mounted instrument has an indicator marked off into four sections, each one a different color.



CAMSHAFT PRECISIONAIRE offered by the Sheffield Corp., Dayton 1, Ohio, permits gaging of most critical dimensions and conditions of an automobile camshaft. Six bearing diameters and two lengths of the camshaft are checked with Airsnaps used in conjunction with a five-column and a three-column Precisionaire base instrument. The shaft is revolved manually to check for out-of-round, and also for concentricity of five bearings which is indicated by a variation in float position in an additional three-column Precisionaire. Checking of two lengths is accomplished by additional air jets incorporated in the No. 1 and No. 2 Airsnaps



Gasketed Vertical Sections Combined with Control Center

A dust-tight control center is offered by the Square D Company, 4041 N. Richards St., Milwaukee 12, Wis. The Square D dust-tight design combines standard, general-purpose

AUTOMATIC FORK TRUCK

AUTOMATIC TRANSPORTER

Move materials faster, safer and at a saving with Battery Electric Trucks and EXIDE-IRONCLAD BATTERIES

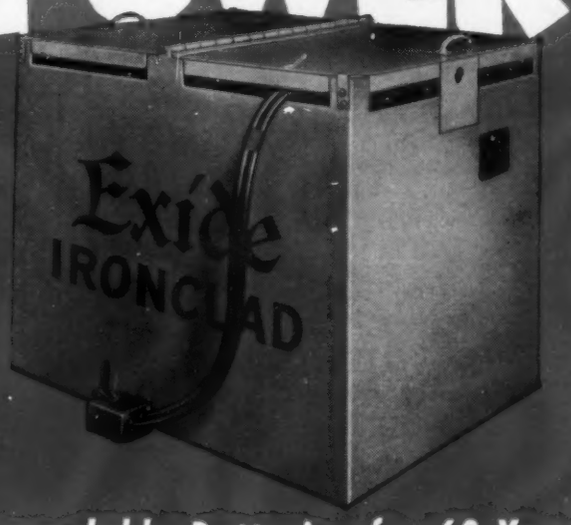
Put battery electric trucks to work saving and earning for you. In thousands of plants, with material handling problems like yours, they are helping to boost production and cut costs. In fact, industrial management has found that materials handling is one of the few remaining fields where major economies can be effected.

Battery Electric Trucks can save time, manpower and money for you in loading and unloading cars and trucks . . . in handling materials in process . . . in hauling and tiering in warehouse . . . in *every* materials handling job from receiving to shipping. And for dependable, long-lasting power, equip your trucks with Exide-Ironclad Batteries, the batteries that assure full shift dependability, day after day, year after year.

Exide-Ironclad Batteries have ALL FOUR of the vital characteristics of an efficient storage battery—high power ability, high electrical efficiency, ruggedness and long life.

Write for further particulars and FREE copy of Exide-Ironclad Topics. It covers latest developments in materials handling and shows actual case histories.

DEPENDABLE POWER



1888 . . . Dependable Batteries for 60 Years . . . 1948

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

"COOLIE" CONVEYING IS COSTLY

Yes, "coolie" conveying is costly because it takes so much manpower to reach modern production capacity levels. If you're using manpower in material handling — you're using a "coolie" system. Conveyors keep manpower on the production line! Investigate Standard Conveyors to handle pieces, parts, units, assemblies, cases, cartons, boxes, barrels, bales, bundles, packages — everything from mail to malleable iron castings! There's one to meet your needs in shop or warehouse. Standard Conveyor Co., General Offices: North St. Paul 9, Minn. Sales and Service in Principal Cities.

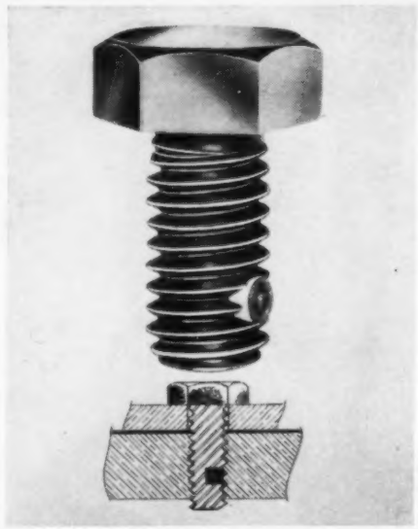
VISIT OUR EXHIBIT
NATIONAL MATERIALS HANDLING SHOW
BOOTHS 706 707
PHILADELPHIA--JAN. 10-14, 1949

FREE HELPFUL LITERATURE
Send for Standard's Catalog. See how conveyors are used in every field of industry. Ask for Bulletin No. AM-128

Standard
GRAVITY & POWER
CONVEYORS

control-center units with heavily gasketed vertical sections. A large, vault-type door handle operates three-point, roller-guided locking bars which clamp the door into place. Units are available with circuit breakers through 600 amp., starters through NEMA size 5, lighting transformers and panelboards, and other miscellaneous devices covered by NEMA standards.

Parts and Materials

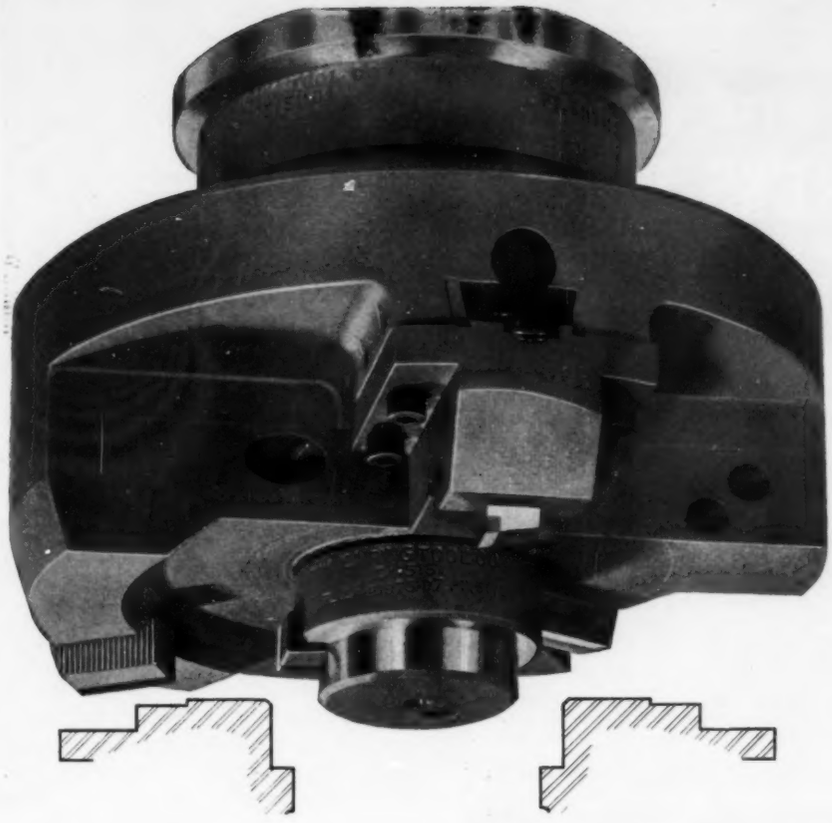


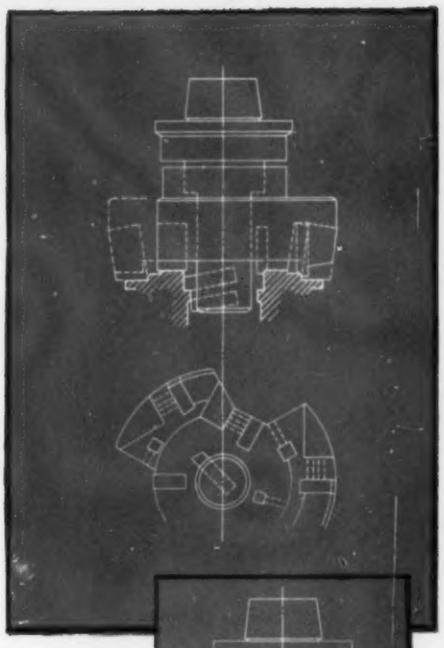
SELF-LOCKING CAP SCREW is offered by the Diamond Head Screw Corp., 6715 Hollywood Blvd., Los Angeles 28, Calif. It is a standard cap screw with a built-in locking feature consisting of a nylon insert set into one side of the threaded segment. In operation the plug exerts a lateral thrust, axial to the plug, causing tight mating of the threads on the opposite side of the screw. The DuPont industrial nylon used is tough and resilient, and withstands operating temperatures well above 250 F.

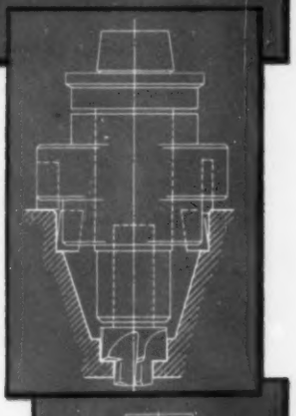
Universal Air-Line-Joint Directs Fluid to Operation

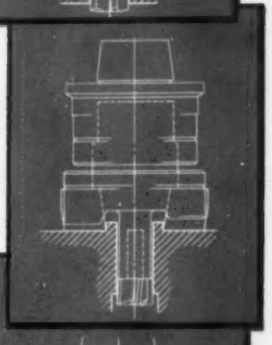
The Universal air-line-joint directs and maintains a jet of liquid or air to any point or object in a machine operation. Its use is said to eliminate the frequent adjustment necessary when using make-shift pipe-fitting assemblies or semi-rigid tubing.

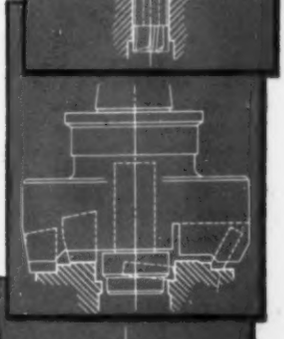
Offered by the Universal Air-Line-Joint Mfg. Co., Lafayette, Ind., the joint can be used with liquid cool-

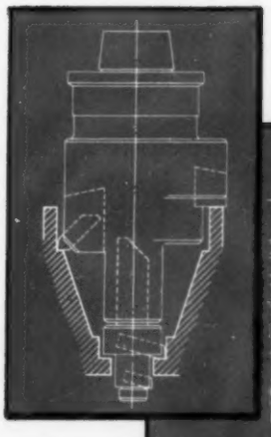


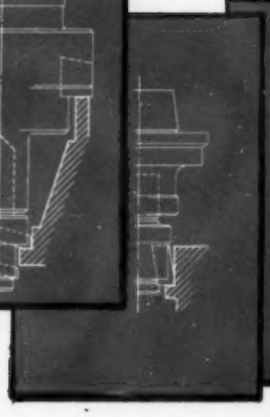


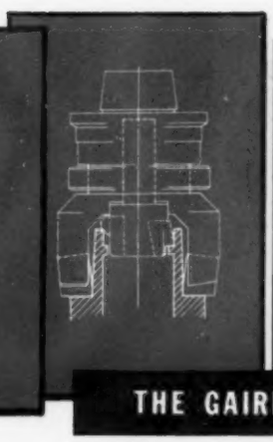


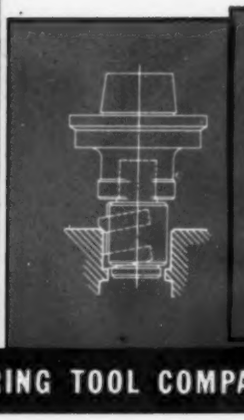


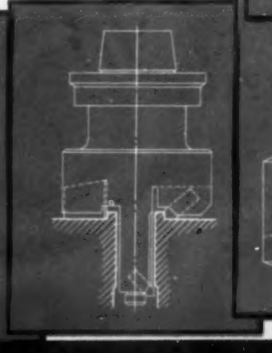


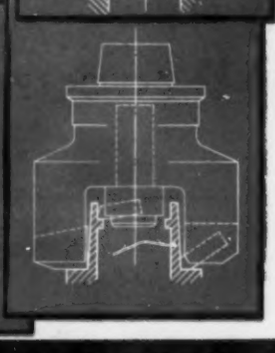












Multiple Tooling

Drawings show complete tooling for a two-way, trunnion-type, four-spindle, roughing and precision boring machine, producing power take-off units. Each tool performs one or more operations such as boring, counterboring, chamfering, facing, and hollow milling.

More precision parts at lower costs are made possible through specially designed inserted blade cutting tools.

This actual example of multiple tooling recently completed by GAIRING suggests how the use of sound and proven principles of cutting tool design might improve the production of *your* machines.

So, if your present production falls short of expectations, let GAIRING'S engineers make a comprehensive analysis of your problem.

GAIRING TOOLS

THE GAIRING TOOL COMPANY · DETROIT 32, MICHIGAN

STEP UP PRODUCTION WITH • • • •

PRESS-RITE

OPEN BACK—INCLINABLE PUNCH PRESSES

PRESS-RITE No. 12
12 ton Punch Press

New design and construction features of PRESS-RITE Presses increase your production greatly through fast time saving set-ups . . . maximum press speeds . . . longer life . . . minimum maintenance . . . and improved operator morale and efficiency!

GREATER SAFETY AT NO EXTRA COST!

Simple in design but positive in operation, the new Single Stroke Mechanism and the patented Automatic Cam Actuated Brake provide the greatest safety ever built into a line of presses. Operator fear is replaced with confidence. Rejects are minimized. Operator fatigue is reduced. The result is increased output from each PRESS-RITE Press in your plant.

6 STANDARD MODELS FROM 5 to 30 TON CAPACITY. Used by leading manufacturing plants, there is a PRESS-RITE Press to meet your operating requirements.

See your local PRESS-RITE dealer or write to Dept. 278 today for FREE bulletin.

Sales Service Machine Tool Co.

PRESS-RITE PRESSES · SHAPE-RITE SHAPERS · KELLER POWER HACK SAWS

2363 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

"We've Found PROCUNIER Tapping Heads PERFORM BEST!"*

That's what they all say . . . men who have used Procunier Tapping Heads in the shop for years. Consistent, accurate tapping and faster tapping with a minimum of tap breakage . . . *as reported by actual users* over the years . . . has made "Procunier" the standard of the industry. Such features as the sensitive, double-cone friction clutch, which engages the surfaces of the drive and reverse shells with a soft, "cushioned" action . . . the heat-treated gear reversing mechanism . . . the ball bearings for long life and accuracy . . . the simple, single-hole lubrication, have made Procunier noted for *economy, accuracy and better performance.* See how these Procunier Heads . . . proven on all kinds of jobs for over 30 years . . . can save you time and money. *Write today for brochure giving complete prices and specifications on the entire line.*

*Name on request.

"Tru-Grip" Tap Holder

Lighter, smaller in diameter, it affords easier tapping close to walls or shoulders, eliminates "chewed up" tap shanks.

Procunier
Safety Chuck Company
1418 S. Clinton St. Chicago 6, Ill.

SEND FOR CIRCULAR

PROCUNIER SAFETY CHUCK CO.
14-18 S. Clinton St., Chicago 6, Ill.

Gentlemen:

Please send your illustrated brochures which give complete prices and specifications on Procunier High Speed Tapping Heads and Machines.

Name .....

Address .....

City ..... Zone ..... State .....

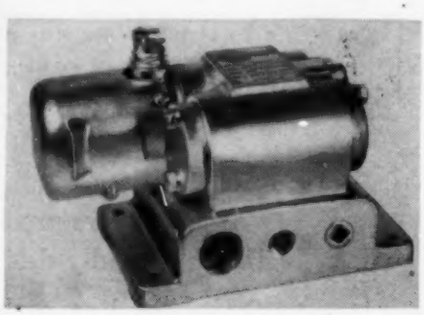
ant on saws, screw machines, lathes, and milling machines, as well as with compressed air on die filers, milling machines and saws. Machine vibration is said not to move the air-line joint. The joint swivels 360°.

Denfis Isopac Isolating Paste Allows Selective Case Hardening

A paste that will keep part of a workpiece soft while the rest is carburized has been developed by Denfis Chemical Laboratories, Inc., 172 Pacific St., Brooklyn 2, N. Y. Known as Isopac, the paste can be applied to work regardless of the method of carburization that is used.

Isopac is applied to the sections to be kept soft and prevents the penetration of carbon gas. It also insulates the protected section to prevent rapid cooling.

The process is said to replace copper plating or other expensive, time-consuming methods. The paste does not crack or shrink when heated and is easily removed after the work is quenched.



Viking Ring-Seal Air Valves Offer Standardized Assembly

Viking Products Co. Inc., 2373 E. Eight Mile Road, Hazel Park, Mich., offers a line of solenoid-operated ring-seal air valves, using a single interchangeable valve assembly.

The interchangeable valve assembly is used in all valves up to ¾ in. and larger whether three-way or four-way, and whether three- four- or five-port. Speed of the valves is up to 600 strokes per min. The valves do not require the use of pilot valves.

Lock Nut, Weld Nut Combination Utilized in Nut-Bolt Assembly

The Gripco combination weld nut and lock nut is offered by the Grip Nut Co., 310-C South Michigan Ave., Chicago 4, Ill. The Gripco 3-point projection weld nut reaches the bottom of the nut counterbore about

FOR 1001 pressing, bending, forcing, straightening OPERATIONS

HYDRAULICS Rodgers KEEP THE WORLD MOVING

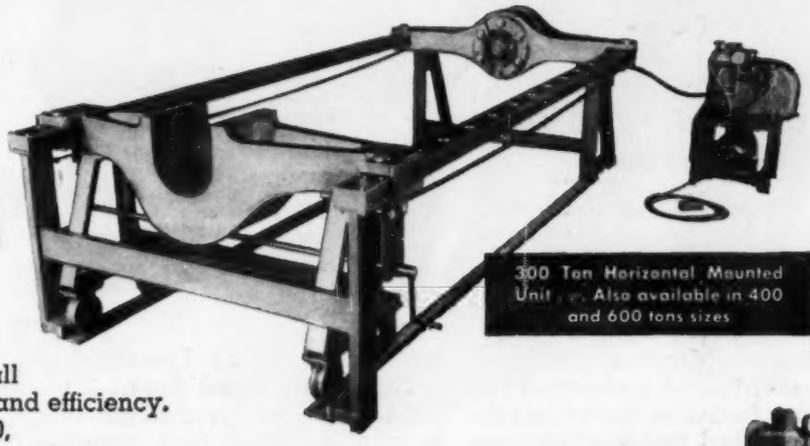
Rodgers Versatile

FORCING PRESSES

✳ STATIONARY OR PORTABLE

✳ HORIZONTAL OR INCLINED

✳ 100 TO 600 TONS CAPACITIES



300 Ton Horizontal Mounted Unit . . . Also available in 400 and 600 tons sizes

Here is your practical answer to those many heavy forcing jobs — a versatile Rodgers Forcing Press with all the features of operating convenience and efficiency.

The stationary model comes in 300, 400 and 600 tons sizes, with either horizontal or 75° inclined mounting; a portable model is available in 100 or 200 tons capacities. Hydraulic power is supplied with either hand or power-driven pumps. Remote controls on power-driven pumps permit operator to stay close to the work, assuring accuracy of the job.

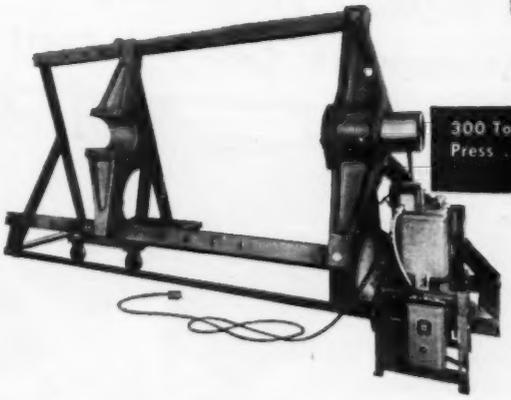
Each Rodgers press is designed and constructed for convenience in assembling and disassembling as well as operation. Head member, yoke abutment and hydraulic pump are independent units easily assembled where needed.

The Rodgers Portable with horizontal frame mounting . . . Made in 100 and 200 tons capacities

Send for

FORCING PRESS FOLDER

giving complete information.



300 Ton, 75° Incline Mounted Press . . . Also in 400 and 600 tons

Rodgers Hydraulic, Inc.

Hydraulic Power Equipment

Shop Presses

Crawler-Track Presses

7407 WALKER ST., ST. LOUIS PARK
MINNEAPOLIS 16, MINN.

Power Pump Units

Portable Presses

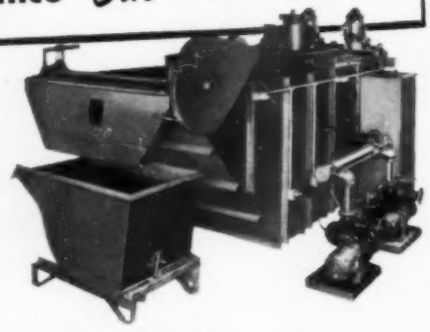
Which GRINDER has HOFFMAN Filtration?

2 hrs. for cleaning
5 to 10 wheel dressings
14 adjustments for size
8 hrs. without stop
1 wheel dressing
1 adjustment for size

Using two identical grinders, a prominent automobile manufacturer never made scheduled production on cast iron valve guides. Then a Hoffman Model 18 Flotation Unit was installed on one of the grinders. It ran without pause through a full eight-hour period. The other grinder required from 20 minutes to an hour to get it to run properly (see panel above.) Now Hoffman flotation equipment enables the car maker to meet higher production schedules easily.

In your case, too, HOFFMAN AUTOMATIC COOLANT CLARIFICATION will *Increase* Productivity *Save* Maintenance *Cut* Unit Cost!

Entirely automatic—no filters to change, no strainers or sumps to clean. Former "down" time becomes new productive time while you save wheels, diamonds and soluble oil replacement costs in the bargain. Total savings more than pay back your investment. For increased, low-cost machining, get the facts in Bulletin A-690 *now*.



Models from 20 to 1,000 g. p. m.
Larger sizes to your specifications

U. S. HOFFMAN MACHINERY CORPORATION
211 Lamson St., Syracuse, N. Y.
COOLANT FILTERS · FILTRATION ENGINEERING SERVICE

¼ of the way through, causing the metal particles to fall on the counterbored portion, which slants outward, instead of on the threads.

The thickness of the Gripco nut is increased to compensate for the threads removed by counterboring, thread depth being the same as in a standard nut. The Gripco 3-point weld nut has three projections for welding contact, assuring firm non-rocking electrical connections when making the weld.

Christman Plastic Decalcomania For Specialized Applications

The Christman plastic decal, a decalcomania for specialized applications on plastic surfaces, sheetings, baked synthetic enamels, wrinkle finishes, leatherette, leather, and synthetic fabrics, is offered by Christman Engraving Co., Battle Creek, Mich. The decal features cumulative adhesion. It sets up a bond within a few hours after application, said to improve from week to week. It is said not to dry or chip.

Gear Transmissions, Spindles For Variable-Speed Control

The DoAll Co., Des Plaines, Ill., offers a line of gear transmissions and flange spindles to accompany the DoAll Speedmaster variable-speed control unit. Capacities range from 0.1 to 7 hp., having reduction ratios of 40 to 1, 17 to 1, and 4 to 1.

Several are two-speed units with convenient gear shifts for quick change of speeds. The flange-mounted spindles are equipped with anti-friction precision bearings designed for continuous operation and suitable for a variety of purposes, ranging from light to heavy work.

Six Cleaners with Different Properties Offered by H-VW-M

The Hanson-Van Winkle-Munning Co., Matawan, N. J., offers a group of cleaners covering a varied range of applications. Matawan No. 20-W is a mild non-etching cleaner containing a synthetic wetting agent and an effective water softener. It is primarily a soak cleaner for aluminum.

Matawan No. 20-X is a mild non-etching alkaline cleaner containing a base which aids in the stripping of paint and heavy oil films from aluminum.

Matawan No. 25 is a non-silicated medium-caustic base especially designed for the etching of aluminum

***"Freedom from flaw or defect; firmness, strength, trustworthiness."** *Webster*

Cemented carbide tools have been a boon to metal-working industries in their ability to increase production and decrease costs. To do this consistently and at minimum expense for maintenance, they must have soundness and uniformity. These properties are attained to a marked degree in Kennametal by distinctive processing and precise laboratory control throughout every stage of manufacture—from refinement of raw materials to sintering of finished product.

A sound, close-grained physical structure, free from porosity, characterizes all Kennametal compositions—a guarantee of uniform hardness and strength. Superior tool performance is therefore obtained. Reliability and durability are outstanding.

There are eight different grades of Kennametal, and a wide range of tool sizes from which to make selection for specific machining requirements, as listed in Catalog 48. You can buy Kennametal tools and blanks with assurance of highly satisfactory service. They are all efficient performers—money savers on production and maintenance.

Money—important tool of industry and trade—is an instrument for accurately evaluating the worth of goods and services in exchange activities only as it remains firm and trustworthy.

For 15 years we have had "managed" currency, and with it has come uncontrollable inflation. Dollars are plentiful, but "porous". The cost of living—for families and business concerns—has skyrocketed. Uncertainty prevails.

Return to sound money—an honest medium of exchange★—will help stabilize our economy, put a curb on the potentially infinite use of currency, automatically check inflation and dangerous expansion of credit, and restore confidence. Individuals can then know with certainty the worth of earnings and savings; businessmen will be enabled to continue worthwhile enterprises with assurance. Palliatives may ease the pain of economic ills, but sound money is an effective cure.

★ **Bill H. R. 5031** introduced into the House of Representatives, January 20, 1948, by Congressman Buffet of Nebraska cited as the "Gold Standard Act of 1948."

A BILL

"To restore the right of American citizens to freely own gold and gold coins; to return control over the public purse to the people; to restrain further deterioration of our currency; to enable holders of paper money to redeem it in gold coin on demand; to establish and maintain a domestic gold coin standard; and for other purposes."

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE PA

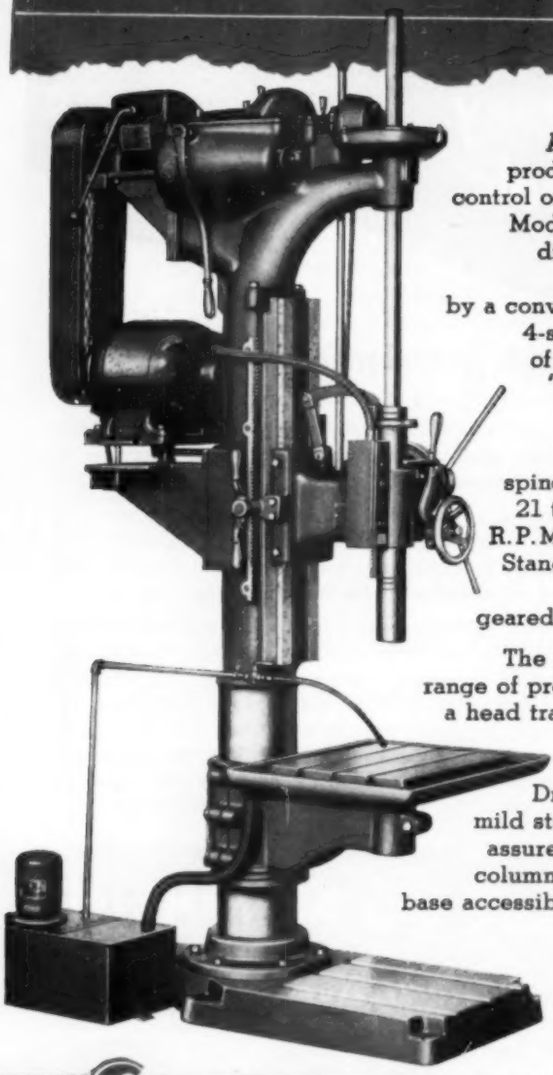
NOTICE

The New

SIBLEY MODEL D

DRILLING MACHINES

in 24" and 28" SWING



An operator gains greater productivity from the ease of control offered by the new Sibley Model D. The V-belt drive is direct to a 4-speed geared transmission, controlled by a conveniently located lever. A 4-station switch at the front of the machine includes an "inching" button to facilitate changing speeds.

Three optional ranges of spindle speeds are available: 21 to 365 R.P.M.; 25 to 419 R.P.M.; and 37 to 650 R.P.M. Standard equipment includes automatic spindle stop; geared power feeds; back gears.

The Model D handles a wide range of precision drilling jobs with a head travel on the hand scraped column of 25" and a spindle feed of 11". Drilling capacity is 1¾" in mild steel. The heavy table arm assures rigidity and swings on column, to make the machined base accessible for a working surface.

Model D-24 Drilling Machine is illustrated complete with coolant pump and fittings, electrical reversing, 5 H. P. motor, magnetic starting switch, and rectangular oil groove table.

SIBLEY

MACHINE & FOUNDRY CORP.
20 EAST TUTT STREET
SOUTH BEND 23, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
20 East Tutt St., South Bend 23, Indiana
Send Catalog No. 68.

Name_____ Title_____

Company_____

Address_____

City_____ State_____

where the presence of a silicate would inhibit the desired etching action.

Matawan No. 30 is a silicated medium-caustic base cleaner containing no foaming or wetting agent. It is applied principally in spray-type washing machines for steel parts. Seven other cleaners are offered for other types of applications.

Chemicals for Aluminum Surfaces Produces a Protective Coating

A surface-treating chemical for aluminum which produces a protective coating is offered by American Chemical Paint Co., Ambler, Pa. Called Alodine, the chemical can be applied by dipping, spraying in a power washer, or brushing the aluminum parts. The coating is said to require two minutes or less to form.

ROUND TABLE *Discussion*

SHOULD SUGGESTIONS BE SCREENED?

Really, it ought not to matter, but it is a question of human nature, of the calibre of the minds of the people concerned, from top management to assistant foreman. Some bosses think that a suggestion from a workman is a reflection on the foreman for not having thought of it himself. Thus a defensive attitude can be set up which militates against suggestions. This is quite wrong; the more active brains in a concern, the better for that concern. There is no head big enough to contain all the brains required. A generous attitude is necessary.

I have seen a youth's suggestion for the avoidance of regularly recurring scrap ridiculed by the foreman one day and put forward as the foreman's own, the next. I have known a man threatened with discharge for sending forward an accepted suggestion. His nom-de-plume alone saved him.

Human nature does not change, and it would be best, probably, and enable both favoritism and prejudice to be avoided, thereby, if every suggestion were dissociated from its originator's name; given a code number enabling all such to be considered impersonally. Decisions should then be possible, solely on the merits

of the ideas put forward. Whether the identities of suggestors should be published later would be a matter for local consideration. The best results can be expected in association with broad minds.

P. E. James
Lincoln, England

•

PRESENT OR BRIBE?

Were employers to make a practice of discouraging the giving of presents to men in executive positions, it would prevent considerable embarrassment and misunderstanding. The means with which they could do this discouraging are many. They could state it in the handbook which some employers pass out to their new employees; they could forbid the practice in the statement of essential aims and policy of the company.

A gift is a noble thing in its place, but to present such a thing to a foreman, who has to exercise his judgment in an uncompromising manner at all times, is decidedly out of place.

The idea of a gift usually starts with the shop extrovert. He usually awakens in the morning with a beaming smile and a burning question in his mind: "Now what can I start rolling today?" He's the fellow who always wants to get things started—and believe me he always does. He'll make it a point of going up to the foreman and asking him for a nice, clean sheet of paper and if, by chance, he arouses the boss's curiosity he'll usually reply with a cheerful laugh and a quiet, confidential "You'd be surprised, Ed!" This sheet he'll pass on to a few of his intimate friends for signatures, and by the time it has made the rounds it has been signed willingly, apathetically, and grudgingly. One or two who have the fortitude to refuse usually do so because they are opposed to such a thing—either from the standpoint of their consideration for the receiver or because such practices, if encouraged, result eventually in a universal riot of unkindly remarks.

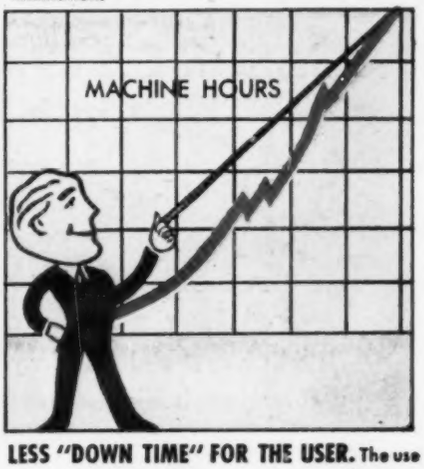
There seems to be no harm for a foreman to receive a gift from his men providing it is a token of esteem at the time of his leaving the plant for good. To thoughtlessly place a good man on the spot by lavishing him with compromising sugar in the form of a present is decidedly unethical. The poor fellow cannot openly say that he objects to receiving it; he usually makes the presenter's veins tingle, with something

LAMINUM* SHIMS GIVE THE FULL SAVINGS OF SHIM DESIGN!

PRECISION ADJUSTMENTS by simply peeling laminations. No grinding, miking, filing. Machining tolerances are greatly increased because the shim provides for exact fit and takeup.

AT-THE-JOB ADJUSTMENTS. No need for standby lathe or operator. The only tool required is a jackknife to peel off a .002" or .003" lamination.

PREVENTION OF OIL AND PRESSURE LOSS. Fitted with babbitted lugs, LAMINUM shims will also seal oil in the bearings of high speed pressure-lubricated equipment.



LESS "DOWN TIME" FOR THE USER. The use of LAMINUM provides a permanent adjustment feature to allow for wear and preserve critical accuracy.

Send today for chart illustrating 46 money-saving, time-saving applications, detailed specifications, sample of LAMINUM.

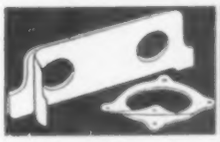
PRECISION STAMPINGS in any quantity

Let us quote on your *difficult* stamping jobs. Our experience, tools and presses are geared for *close tolerance* production.

* LAMINUM (Reg. U. S. Pat. Off.) shims are solidly bonded laminations of .002 or .003 inch precision gauge brass or steel with a microscopic layer of metallic binder. Cut to your exact specifications.

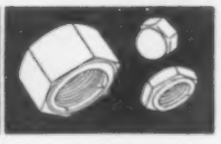
LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

LAMINATED SHIM COMPANY, Inc.
3112 Union Street Glenbrook, Conn.

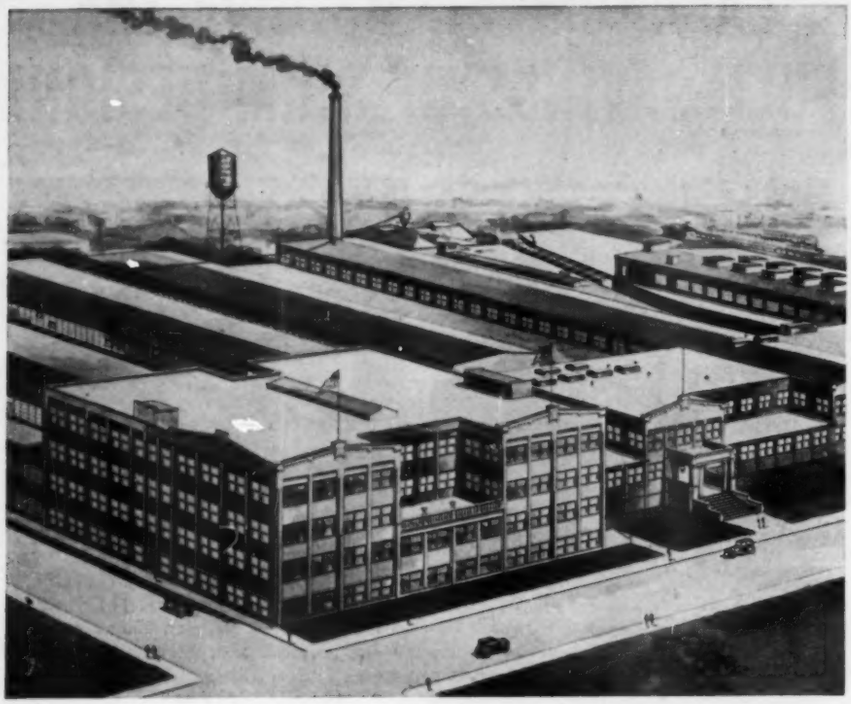

SHIMS

SHIM STOCK

STAMPINGS


AN-COR-LOX NUTS

"KEX" Industrial Wiping TOWELS



American Laundry Machinery Company
Cincinnati, Ohio

Uses "KEX" Service

THE list of subscribers to "KEX" National Service reads like a volume of America's Industrial "Who's Who."

The low cost and efficiency offered by "KEX" Industrial Wiping Towels are behind this definite trend to "KEX" National Service. Managements like the idea of this automatic rental service that follows their wiping towel needs from week to week. The neat, easily handled bundles in which "KEX" are delivered help control distribution, and contribute to better housekeeping.

Follow the lead of industrial leaders all over the country who overlook no opportunity to keep costs down—and efficiency up.

Nothing to Buy—No Expensive Inventory—Just a Low Monthly Rental. The first month should show a decided saving on wiping costs.

For complete information, see your classified Telephone Directory for nearest KEX distributor, or write KEX NATIONAL SERVICE, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE
REG. U.S. PAT. OFF.

like this: "Oh, Bill (he's the fellow who got awake smiling), the fellows shouldn't have done this." What he really means is that they shouldn't have done this "to me." I feel that the greatest gift one can give his foreman is loyalty and conscientious effort. He's got a hard enough road to travel without making his hours more difficult by placing compromising obstacles in his path.

John Homewood
Ontario, Calif.

•

FACE-TO-FACE—OR BACK-TO-BACK

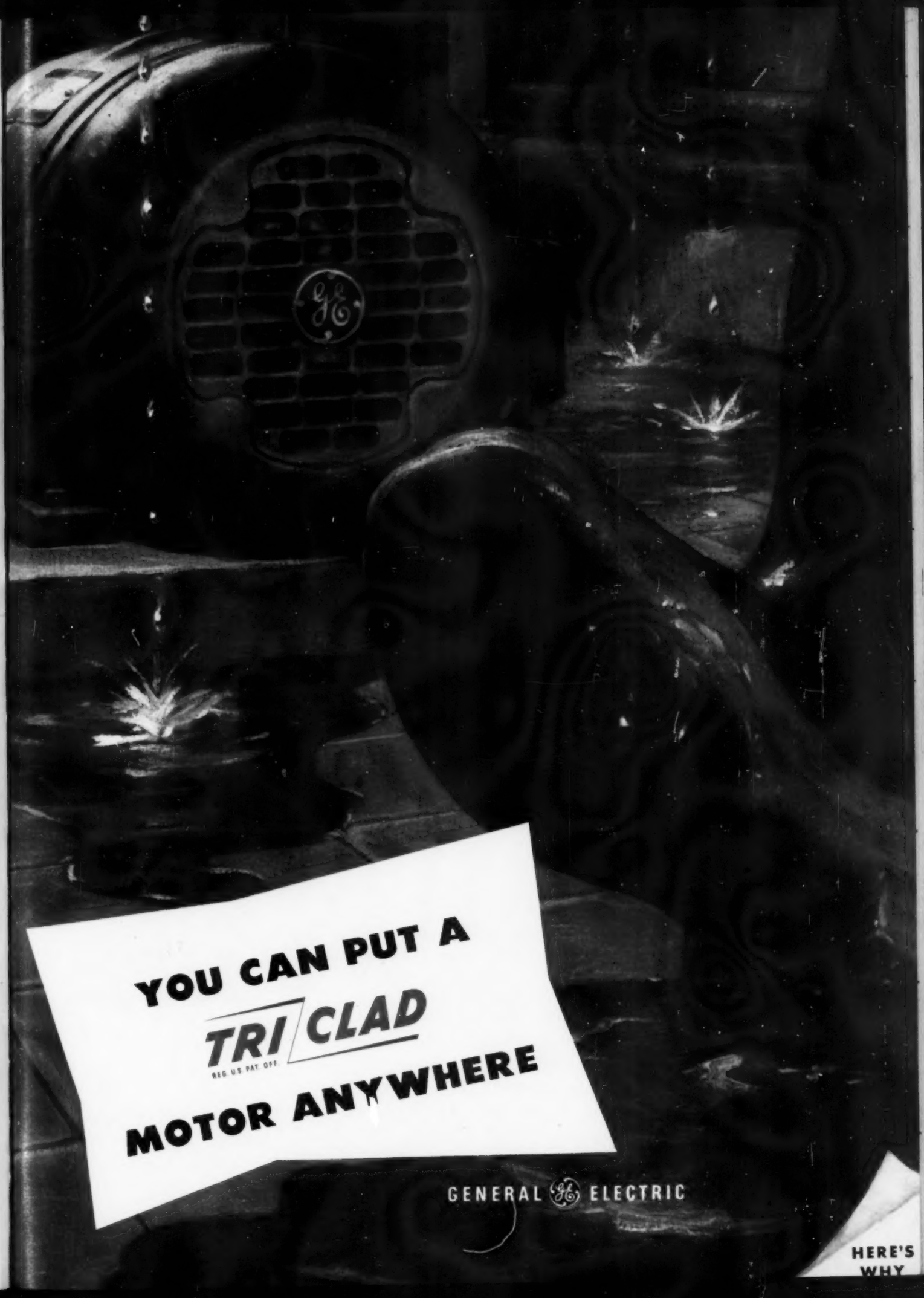
A monthly assembly at which the "Old Man" talks directly to his help is a good idea under certain conditions. However, if the assembly is to produce any good results, the "Old Man" must be honest with his men. He must speak frankly in his natural manner with conviction in simple words on specific subjects. Smooth talk, using fancy words regarding generalities, will only create suspicion. The "Old Man" cannot always be asking the men for cooperation without ever offering to correct mistakes of management.

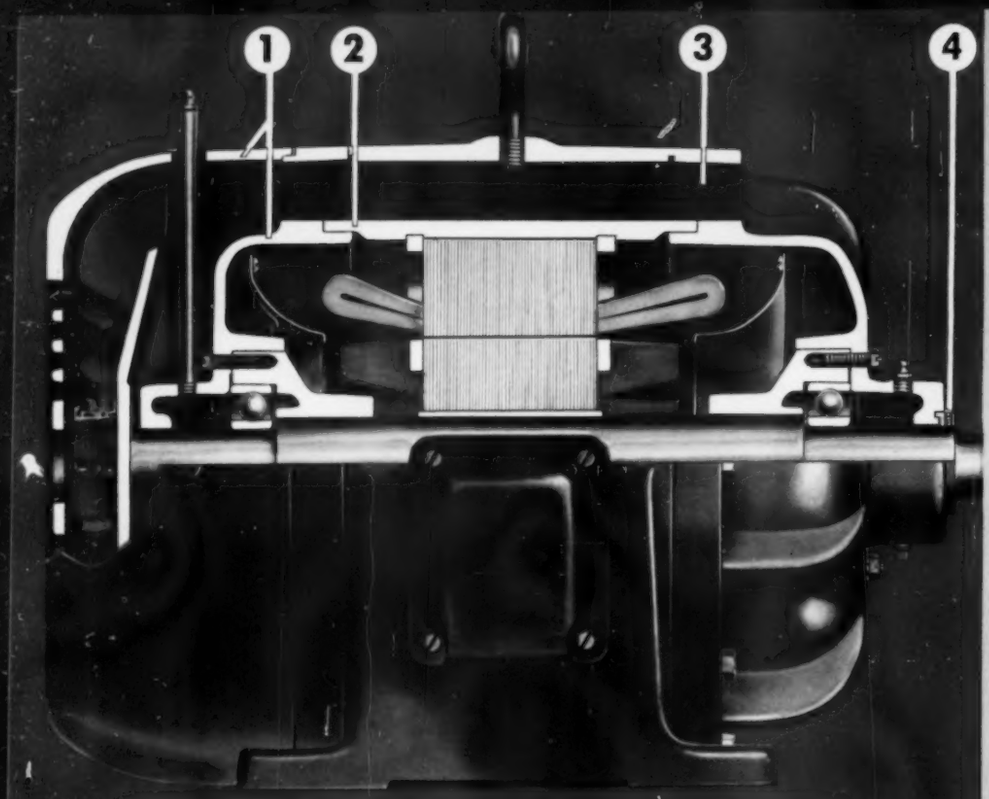
The "Old Man" should take this opportunity to answer written questions submitted in advance of the assembly. If the question is on a subject which he considers is not the business of the employees he should say so rather than give an evasive answer and lose the respect of his men. A stenographic record of the "Old Man's" statements should be taken and transcribed for distribution to the management staff because it must be recognized as company policy and not just the philosophy of the head man unless it is plainly labeled as such.

If the "Old Man" cannot meet these conditions, he might better keep quiet because, strange as it may seem, the help will believe a labor agitator or politician who promises everything, but will never believe a boss who does not keep every promise. Furthermore, if the "Old Man" is known to be a liar, it will do no good to have any skilled go-betweens speak for him, because the men simply will not accept their "line."

A company is rightly judged by its top men, and company statements which are not in keeping with the character of the top men are just bunk to the help. As in other spheres of life it is sometimes better to say nothing than to say the wrong thing.

C. A. Johnson
Springfield, Mass.


YOU CAN PUT A
TRI CLAD
REG. U.S. PAT. OFF.
MOTOR ANYWHERE
GENERAL ELECTRIC
HERE'S WHY



The standard totally enclosed Tri-Clad features a *cast-iron* double-wall structure (1) that keeps outside air from electrical operating parts . . . machined-fit end shields (2) . . . large air passages (3), easy to clean . . . rotating labyrinth seals (4) that keep foreign matter from working in around the shaft. Note, too, the new corrosion-resistant G-E Textolite cooling fan is now standard on all 1- to 15 hp TEFC Tri-Clads.

You can put a TRI CLAD motor anywhere

YES SIR! The standard *Tri-Clad* open motor is a *cast-iron, dripproof* motor you can put anywhere that *any* open motor can be used—and in a lot of places where other open motors couldn't take it.

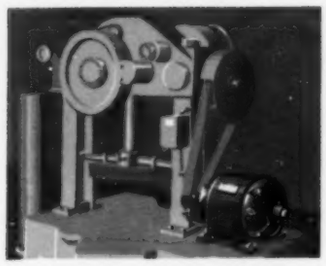
What's more, for the really dirty jobs—where air is laden with dust, or corrosive fumes—where metal chips and cutting fluids abound—the Tri-Clad totally enclosed motor gives you more protection, *inside and out,* than any other make of motor you can buy.

1,720,000 Tri-Clad motors, operating in every conceivable kind of plant, prove the far-reaching advantages of cast-iron construction . . . superior resistance to corrosion . . . rigidity that makes for permanent shaft alignment . . . inherent damping action that minimizes noise and damaging vibration. These motors prove, too, that Tri-Clad double-end ventilation simply has no equal for prolonging an open motor's useful life. Providing high-volume, relatively low-velocity cooling, this ventilating system keeps Tri-Clad motors *uniformly* "air-conditioned".

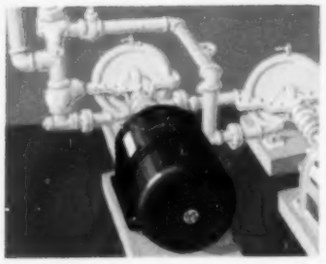
WANT MOTORS THAT CAN REALLY TAKE ABUSE? Tri-Clad motors in nearly all types and ratings are available for **IMMEDIATE SHIPMENT.** Contact your nearest G-E Office or write *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

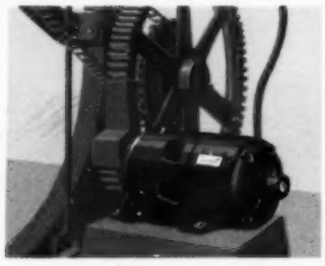
There's a Tri-Clad motor for every industrial need!



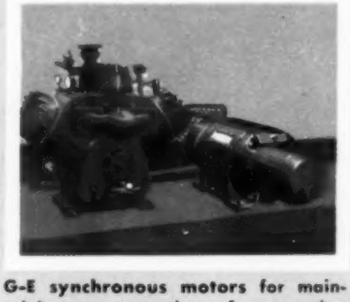
G-E open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for outdoor operation, in abrasive dusts, or corrosive fumes. From 1 to 1000 hp.



G-E gear-motors for low-speed operation. A normal-speed motor with built-in reduction gear. From ⅛ to 75 hp.



G-E synchronous motors for maintaining exact speeds or for correcting power factor. From 20 to 1000 hp.

YOU CAN'T BEAT TRI CLAD REG. U.S. PAT. OFF.

EXTRA PROTECTION

FREE LITERATURE

New Catalogs, Booklets, Bulletins

MACHINERY AND ATTACHMENTS

1 DRILLS—National Automatic Tool Co. Inc., Richmond, Ind. 16-page booklet 748 describes single-spindle and fixed-center multi-spindle Holesteel drillers and tappers. Examples of jobs done on these machines are also given.

2 THREAD CHASERS — Eastern Machine Screw Corp., New Haven 6, Conn. 4-page folder 15 describes H&G insert chaser die heads for Davenport automatic screw machines.

3 CABINET FORMING MACHINES —Cyril Bath Co., Cleveland 3, Ohio. 12-page catalog C700 describes machines developed for manufacture of metal cabinets, cases, housings, liners, and shrouds. Press brake dies for bending, flanging and beading are also illustrated.

4 TABLES—Troyke Mfg. Co., Cincinnati 9, Ohio. Catalog 14, 8 pages, illustrates rotary tables for drills, mills and bench work. Included are indexing and cam-locking types.

5 PRESSES—Verson Allsteel Press Co., Chicago 19, Ill. 16-page booklet G-47 gives information on how to select a press for blanking, drawing, ironing, or squeezing. Presses, dies and brakes are described and many phases of press work are discussed.

6 DIE FLIPPER—Moore Special Tool Co. Inc., Bridgeport 7, Conn. 8-page catalog describes die maker's tryout and assembly machine which aids in testing alignments. Photographic examples of the uses of the machine are illustrated.

7 TAPPERS — Warner & Swasey Co., Cleveland 3, Ohio. Bulletin illustrates No. 11 tapping and threading machine with a guide-hobbing lead screw, quick acting safety clutch and depth control. Specifications are tabulated and controls and features are described.

8 BALANCERS—Bear Mfg. Co., Rock Island, Ill. 24-page booklet describes and illustrates dynamic balancing machines in several models. Text on how dynamic balancing is done is included.

TOOLS AND ACCESSORIES

9 DIAMOND TOOLS—Anton Smit & Co. Inc., New York 19, N. Y. 12-page folder 7 gives prices, sizes and dimensions of diamond tools including wheels, saws, hardness testers and cutting tools.

10 PLUG GAGES—Threadwell Tap and Die Co., Greenfield, Mass. 46-page catalog 48G gives specifications and prices for go, no-go and progressive limit gages as well as ring gages and thread-measuring wires. Adjustable limit plug gages, length gages and snap gages are also depicted.

11 POWER SCREWDRIVERS — Detroit Power Screwdriver Co., Detroit 16, Mich., 24-page booklet describes magazine-feed power screwdrivers and motorized hopper units, featuring the uniform-tension clutch design. Samples of work done by both machines are illustrated.

12 SCREW - MACHINE TOOLS — Boyar-Schultz Corp., Chicago 12, Ill. 24-page catalog describes line of tools for screw machines, including turning, burnishing, reaming, tapping, drilling and knurling tools, in addition to other components.

13 GAGE BLOCKS — Dearborn Gage Co., Dearborn, Mich. 6-page folder features Ellstrom chromium-plated gage blocks in a number of sets of different sizes. Prices for the sets are included.

14 RECORDERS — Leeds & Northrup Co., Philadelphia, Pa. 32-page catalog ND44(1) includes information on a line of strip-chart Micromax recorders and controllers for measuring such process variables as temperature speed, gas analysis, electrolytic conductivity and pH factor. Engineering data for setting up a number of controllers is included.

15 BORING TOOLS—Wendt-Sonis Co., Hannibal, Mo. 8-page catalog contains specifications and illustrations of boring-head sets, boring tools, vises and fly bars. Dimensions, taper-shank information and prices are included.

16 DIE SETS—Evans Reamer & Machine Co., New Lexington, Ohio. 72-page booklet contains information and specifications on die sets and companion equipment such as ball-action die liners, guide pins, and bushings.

17 AIR TOOLS—Buckeye Tools Corp., Dayton 1, Ohio. 38-page catalog features line of Stream-Power portable air tools for grinding, milling, sanding, driving screws and nuts, and shearing. The catalog is in loose-leaf notebook form.

18 pH CONTROLS—Brown Instrument Co., Philadelphia 44, Pa. 44-page catalog 15-12 describes pH factor and how it can be controlled and indicated. Engineering data applicable to a wide range of fields is included, as are descriptions of instruments, controllers, and recorders.

19 GEAR CHECKER—National Broach and Machine Co., Detroit 12, Mich. 16-page booklet C45-11-A describes the Red Ring universal gear checker for indicating helical angles, tooth sizes, and parallelism. Illustrations show set-ups for checking gears.

HEAT TREATING AND WELDING

20 WELDING — The Air Reduction Sales Co., New York 17, N. Y. 6-page folder is an article on the development of the gas-shielded metal arc welding process by Jesse S. Sohn and A. N. Kugler and describes the new Aircomatic process.

21 WELDING GRIP—Tweco Products Co., Wichita 1, Kansas. 12-page catalog features Tweco Tong welding-rod grips, ground clamps, cable splicers, and other welding accessories. Prices are included.

22 THERMOCOUPLES — Wheelco Instruments Co., Chicago 7, Ill. 40-page bulletin T/C 7 is a catalog and data book on thermocouples and parts including wires, heads, connectors, plug and socket assemblies, insulators, and protective tubing. Much of the engineering data is applicable to any thermocouples.

Example

Name. John Roderick ..... Fill in below number of ONE catalog wanted

Title. Supt. .....

Company W.C. Davi Mfg. Co. ..

Co. Address 601 North St. ....

Brooklyn, 7, N.Y. ..... (32)

AMERICAN MACHINIST, New York

How to Order

1. If you are requesting four pieces or less, please use only the bottom card.
2. Be sure to fill one space for each booklet.
3. When you have filled out one card, detach stamp and mail.

Name .....

Title .....

Company .....

Co. Address .....

.....

FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )

AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
FILL IN BELOW NUMBER OF ONE CATALOG WANTED ( )
AMERICAN MACHINIST, New York — Not good after Mar. 1, 1949

FREE LITERATURE

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place 3¢ Stamp Here

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place 3¢ Stamp Here

23 ELECTRODES — Fansteel Metallurgical Corp., North Chicago, Ill. 4-page bulletin 1102 describes tungsten electrodes for inert-gas and atomic-hydrogen welding.

24 GAS APPARATUS—Victor Equipment Co., San Francisco, Calif. 44-page, four-color catalog 20B describes welding and cutting torches, valves, mixers, and accessories for gas welding, nozzles, tips and regulators, as well as connectors, adapters and cylinder manifolds are described.

PLANT SERVICE EQUIPMENT

25 PUMPS—American Engineering Co., Philadelphia 25, Pa. 20-page catalog describes Hele-Shaw pumps and controls for pumping fluids and for hydraulic pipe testing machines.

26 LIFT TRUCK—Barrett-Cravens Co., Chicago 9, Ill. 88-page Junior Catalog 487 describes lift trucks, hand trucks, elevators, stackers, dollies and racks. Metal-handling equipment includes skids, stacking frames, work benches and hoists.

27 LIFT TRUCKS—Lift Trucks, Inc. Cincinnati 14, Ohio. 12-page catalog K-48 describes hydraulic-lifting electric-powered hand trucks for skid work.

28 CONVEYORS—Harry J. Ferguson Co. Jenkintown, Pa. 24-page, two-color catalog covers a line of gravity wheel conveyors, and gives specifications and capacities for materials-handling equipment.

29 CRANES—Orton Crane and Shovel Co., Chicago 5, Ill. 16-page booklet 77 describes air-controlled locomotive cranes that are either diesel or gasoline powered. Construction details and specifications are illustrated and tabulated.

PARTS AND MATERIALS

30 COLD FINISHING — Jones & Laughlin Steel Corp., Pittsburgh 30, Pa. 12-page technical booklet on cold finish Jalcase Steel contains information on the physical properties of the open-hearth product. Included are photographs, tables and drawings, with data on its analysis, machinability and heat treating.

31 POWER CYLINDERS—Hydro-Line Mfg. Co., Rockford, Ill. Two, 16-page catalogs, A-48 and H-48 LP contain photographs, drawings, mounting data and specifications for air and hydraulic cylinders, including low-pressure hydraulic cylinders with bores from 1½ in. to 14 in.

32 PLUG VALVES—H. K. Porter Co., Inc., Pittsburgh 22, Pa. 16-page illustrated catalog covers a complete line of lubricated plug valves; a full page pictorial drawing explains the operation and parts of the valve.

33 METAL PRESERVATION—American Chemical Paint Co., Ambler, Pa. Seven folders describe specific metal-treating chemicals with illustrations. Chemicals include protectives for aluminum, steel, galvanized iron and rust removers.

34 WIRE ROPE — California Wire Cloth Corp., Wickwire Spencer Steel Div., Palmer, Mass. 180-page catalog gives complete data tables and illustrations on various types of wire rope, engineering data on wire rope in general and specific information on applications are included. The 50th anniversary catalog is liberally illustrated and includes charts of specifications.

35 ROLLER CHAIN—Atlas Chain & Mfg. Co., Philadelphia 24, Pa. 8-page catalog lists prices and specifications for single and multiple chains from size 25 to 200. Improvements in chains are illustrated by drawings and photographs, and other data is tabulated.

36 STEEL CASTINGS — International Nickel Co., Inc., New York 5, N. Y. 32-page booklet presents photographs and data on many varied types of nickel-alloy castings such as those used by railroads, oil companies, construction companies and mills.

37 LINER PINS—Acme Industrial Co., Chicago 7, Ill. 6-page folder includes information on liner pins and dowel pins for die casting, plastic molding, and general use. Included is a conversion table of hardness numerals.

38 RIVNUTS—B. F. Goodrich Co., Akron, Ohio. 28-page data book on Rivnuts explains their use and application by means of line drawings and written material. Rivnut tools and power-operated tools are also illustrated.

39 TOOL STEELS — The Carpenter Steel Co., Reading, Pa. A tool-steel selector, and identification wall chart contains the Carpenter matched set diagram in 12 colors; directional arrows show the tool and die maker, and how to select proper steels for each job.

40 ROLLER BEARINGS — The Tyson Bearing Corp., Massillon, Ohio. 12-page, two-color booklet describes All Rolls tapered roller. Catalog AFBMA-100 entitled Anti-Friction Bearing Maintenance, gives general bearing information, and is compiled by the Engineering Committees, Anti-Friction Bearing Manufacturers Assoc.

41 STEEL BARS—Joseph T. Ryerson & Son, Inc., Chicago 80, Ill. 8-page catalog describes cold-finished steel bar stock and service facilities, and includes AISI and SAE standard steel compositions for bars.

42 FLEXIBLE COUPLINGS—Charles Bonde Co., Philadelphia 6, Pa. 16-page, four-color booklet contains data on flexible couplings for engineers, machine designers and all users of flexible insulated couplings.

43 CASE HARDENING—Denfis Chemical Laboratories, Inc., Brooklyn 2, N. Y. Four-page folder describes Carburit, a paste applied to parts of work that require case hardening, and Isopac, a material for isolating parts that do not require hardening.

44 LAPPING COMPOUND — Timesaver Products Co., Chicago, Ill. Two metal-lapping compounds, one for hard metals and one for soft metals, are described in a four-page booklet.

MISCELLANEOUS

45 STEEL SERVICE—Joseph T. Ryerson & Son, Inc., Cleveland 1, Ohio. 12-page illustrated booklet describes enlarged plant and gives background of company in the Cleveland area.

46 PERMANENT MOLDS — Eaton Mfg. Co., Detroit 13, Mich. 28-page booklet presents a picture tour of the permanent mold foundry at Vassar, Mich., including many perspective drawings of scenes in the plant.

47 PUMPS—Hamilton Thomas Corp., Hamilton, Ohio. 16-page booklet includes photographs and descriptions of the products of company's three divisions: Economy Pumps, Inc., Liberty Planers, Inc., and Klipfel Mfg. Co.

Engineered GEARS . . .

. . . HELP *Engineers* TO DESIGN, OPERATE, AND MAINTAIN BETTER MACHINES . . .

PHILLIE GEAR

Among the many "headaches" that the Design Engineer faces, is the matter of proper gears; in fact, most Engineers *are not and cannot* be "Gear Specialists," so when they spend weeks, months, or even years on the design of an important machine, they want to be able to seek the advice of "Gear Specialists," and then have their *gears made "just right"* . . . in other words, as many of our customers say to us: "*You fellows take care of this whole gear problem.*"

Then too, "*Engineered Gears*" obviously help the Engineers in charge of machine operation and maintenance, so, briefly: Philadelphia "*Engineered Gears*" *help Engineers* all along the line.

Continuous Tooth Herringbone Gears up to 60" diameter; Separated Tooth Gears up to 150" diameter.
Worm Gears up to 150" diameter.
Spur Gears up to 150" diameter.

Our plant is one of the largest and most modernly equipped in America, devoted exclusively to the design and manufacture of Gears of all types, sizes and materials—in any quantities.

Write for your copy of our latest 68-page "Gear Book," and please use your Business Letterhead when requesting same.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

GANSCHOW CUT GEARS

SPUR—SPIRAL
BEVEL—RACK
AND PINION

UP TO 60" PITCH DIA.
UP TO 10" FACE WIDTH

GANSCHOW GEAR CO. • 14 N. MORGAN ST. CHICAGO 7.

GEARS MADE

FROM YOUR PRINTS

Prompt delivery on any type gear —any size from the smallest up to 60" dia.

- Spur Gears
- Bevel Gears
- Mitre Gears
- Helical Gears
- Internal Gears
- Worm Gears
- Herringbone Gears

Highest quality. Precision cut on new Sykes Generators and up-to-date machines. Over 40 years of gear manufacturing experience.

Send your gear prints to us today for prompt quotation!

AUTO ENGINE WORKS
341A N. Hamline Avenue St. Paul 4, Minn.

BILGRAM BEVEL GEARS

Straight — Spiral Teeth

ALL TYPES
ALL MATERIALS

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

CINCINNATI
*Coniflex**

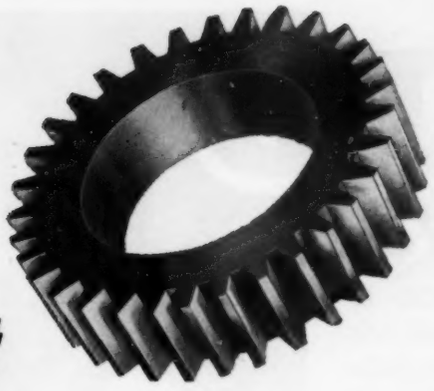
Smoother . . . Quieter OPERATION
. . . WIDER OPERATING TOLERANCE

An outstanding characteristic of Cincinnati Coniflex* Gears is the localized tooth contact. This permits a wider operating tolerance . . . allowing slight deflections in operation without dangerous concentration of the load at the ends of the teeth.

For smoother . . . quieter operation, with easier and faster assemblies . . . we suggest Cincinnati Coniflex* Gears.

* Registered in the U. S. Patent Office.

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio



contact PERKINS

first for custom-cut GEARS

We have manufactured precision gears to customers' specifications for nearly 30 years. Our production equipment comprises modern machine tools and our facilities are ample to meet all demands for the mass production and prompt delivery of such gears.

Our engineers will be glad to work with you on any problems you may have pertaining to gear design. Recommendations as to proper design for *LOWER COSTS*—cheerfully given. Once your specifications are in our files, reorders are filled automatically. *LET US QUOTE ON YOUR REQUIREMENTS NOW!*

YOU FURNISH THE SPECIFICATIONS • WE'LL PRODUCE THE GEARS

PERKINS MACHINE & GEAR Co., Springfield 2, Mass.

PERKINS MAKES in all materials, metallic & non-metallic:

Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Ground Thread Worms

Our extensive facilities and modern machine tools are also adaptable to the manufacture of all kinds of various parts other than gears, such as the following:

SPROCKETS · SPLINED SHAFTS · SCREW MACHINE PARTS

up to 2¼" in diameter.

We are also exceptionally well equipped to build, to your specifications, such mechanical units as—

PUMPS · SPEED REDUCERS & COMPLETE MACHINES

either in experimental or production quantities. Our well-known reputation is your guarantee of satisfaction. Let us quote on your requirements.

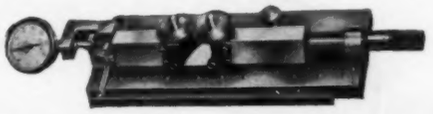
SCHERR *aids to precision – production*

Control the Job From Start to Finish with the WILDER Model A PROJECTOR

New horizontal type for production inspection just out.

Throws a magnified shadow image of the part under inspection against an enlarged drawing of part. Magnifications available, 10x to 200x. Horizontal work table for flat work. Center support and micrometer cross slides for checking forming tools, screw threads, hobs, etc. Eliminates all errors due to "feel." May be speedily operated, with little or no experience. Prevents costly errors and insures initial correctness from the start of a production run. THIS COMPARATOR can be equipped with a new circular type of Surface Illuminator.

The SCHERR GEAR TESTER
A positive check on gear accuracy



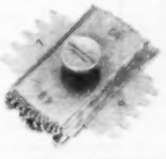
When placed on the work table of the Wilder Micro Projector, an enlarged image of the two meshing gears is thrown on the screen. Also valuable used independently checking center distance, pitch line run-out and various gear errors, shown on dial indicator in .0005" as gears are rotated. Price $145.

An invaluable inspection tool

THE SCHERR MAGNI-RAY

Magnifies the work under inspection, floodlights it as well, and gives the immense advantage of "two-eye seeing." No wonder thousands of Magni-Rays are serving in large inspection departments and other thousands on precision machines or critical toolroom operations. The lens is ground by experts for true magnification. Heavy base permits swinging lens to any position, any height to 14 in. Three types—Model A, 3" lens, 1½x plus, $21.65; Model B, 3x plus, $29; Model C, 5" lens, 1½x plus, $34.

Measure gear pitch quickly



SCHERR GEAR GAGE SET

Any diametrical pitch, from 3 to 64, obtained instantly without counting teeth, measuring gear diameter, or other computation. Used like a thread gage. Teeth are cut in stainless steel segments by Fellows gear generating method, on true arc. Here is something the gear-using world has long needed. Complete set, $12.50. In ordering, specify 14½ deg. or 20 deg. P.A.

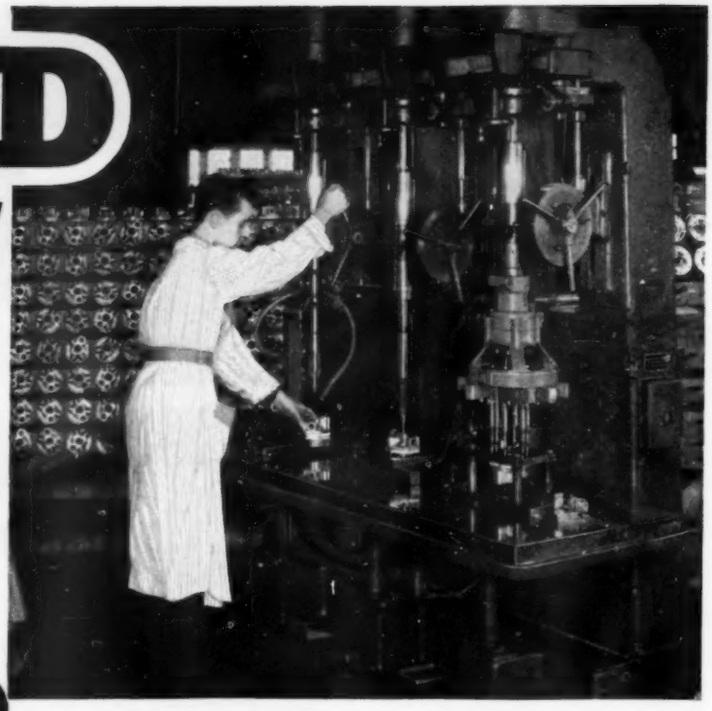
Write for full details on these tools, and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.
200-D Lafayette St. New York 12, N. Y.

RUGGED

Gosh, Yes!

ASSOCIATED AIRCRAFT TOOL & MFG. CO., Hamilton, O., found that U. S. Drill Head's standard adjustable multiple spindle drill heads stood the gaff —and are still going strong after drilling 600,000 holes.



IMMEDIATE DELIVERY!

● ***Write Today*** for latest catalog.

US HEADS SINCE 1915

Also manufacturers of all types of fixed center heads

UNITED STATES DRILL HEAD CO.

CINCINNATI 4, OHIO

---

do you need small pieces like this?

BURRLESS

SCREW MACHINE JOBBING WORK

We have demonstrated an exceptional ability to produce, at low cost, unusually small pieces with close tolerances and fine finish and *without burrs* — largely due to the special features of our own POLYMATIC Screw Machines. In addition, we provide the usual facilities of a jobbing shop concentrating on screw machine work.

UNIT MACHINERY COMPANY

650 S. WYMAN ST., ROCKFORD, ILLINOIS

GEAR CUTTING MACHINES

Well Designed
Good Features
Create Production Advantages

43 Years' Experience

NEWARK GEAR CUTTING MACHINE CO.

69 Prospect Street, NEWARK 5, NEW JERSEY

FRANK E. EBERHARDT, *President*

MP **QUALITY GEARS CUT TO ORDER** MP

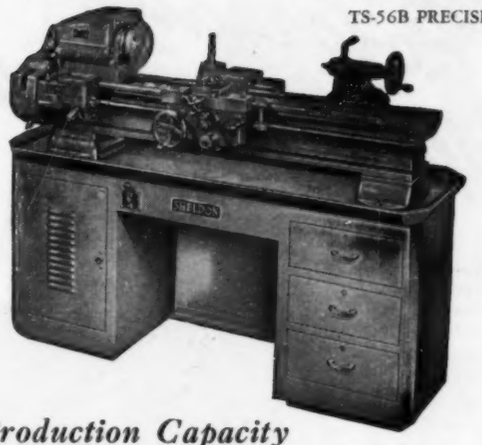
• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MP **MEISEL PRESS MFG. CO.** MP

946 Dorchester Avenue Boston, Mass.

SHELDON

TS-56B PRECISION LATHES



Production Capacity . . . comes ready for production

The new TS-56B Sheldon Precision Lathes have the speed, stamina and capacity for general production use—11¼" swing, 1⅜" hole thru spindle, 1" collet capacity. They will operate safely at high speed and work to the very closest tolerances, *for spindle bearings are "Zero-Precision"* tapered roller bearings, the most accurate obtainable.

They will take a "healthy cut" too *because they have double V-belts to the spindle* to assure full power from their 1 h.p. motor at the point of work. They come ready for production—no breaking-in period is required—start earning from the day received.

Write for Catalog of SHELDON and SHELDON-VERNON MACHINE TOOLS and ACCESSORIES

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4234 N. KNOX AVENUE CHICAGO 41, ILLINOIS, U.S.A.

HARTFORD SUPER-SPACER *Special*

for JIG BORING WORK . . .

Here the Super-Spacer is demonstrating another of its advantages to any tool room. Equipped with a face plate for exact location of work, it can be used on your jig borer to save indexing time, and production cost per piece. The Super-Spacer takes milling, drilling, grinding, planing, slotting, boring and other operations in stride. Investigate its benefits to your shop. Write Dept. S4.

SPECIAL MACHINES BUILT TO ORDER

We have specialized in building machines and parts to our customers' drawings for 36 years. Send your blueprints for prompt estimates.

HARTFORD *Special*

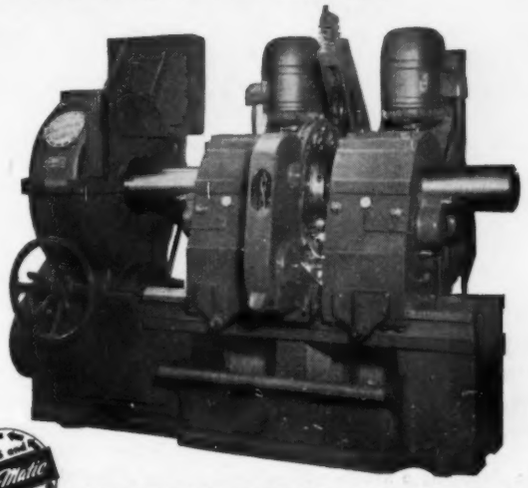
The Hartford Special Machinery Co. Hartford 5, Conn.

Roto 1-A Matic

HORIZONTAL PRODUCTION MILLERS

FEATURING

1 CONTINUOUS OPERATION
2 AUTOMATIC CHAIN CLAMPING
3 ROUGH & FINISH CUTTERS — EACH HEAD
4 3 TYPES — VARYING BED LENGTHS
5 LOW MAINTENANCE COST
6 INTERCHANGEABLE FIXTURES



INDEPENDENTLY DRIVEN HEADS

No. 1-A ROTO-MATIC Millers have been produced for the past 30 years in various sizes and types to do specific jobs faster and better than they have ever been done before. Because of their flexibility they have been designed to take a wide range of work with uniform satisfactory results. Engineering has made possible the milling of several work pieces at one time giving a high production of each. In all cases exacting requirements as to quality of work have been met.

Chain Clamping Fixture for rough and finish milling both ends of Control Arm Trunions to length. Interchangeable buttons make possible the milling of several sizes — Production 296 gross per hour.

Double Chain Clamping Fixture with a total of 28 stations for milling ends of Clutch Gears — Production 200 gross per hour — With this arrangement two different parts can be milled simultaneously.

Double Drum — 50 automatic holding fixtures on each drum for rough and finish milling radius on Rocker Arms — Production 1400 gross per hour.

ASK FOR BULLETIN 121

DAVIS and THOMPSON CO.

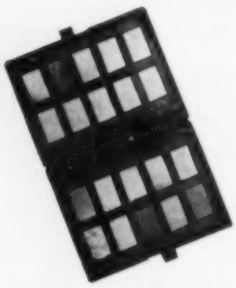
MANUFACTURERS OF *Machine Tools*

MILWAUKEE 14, WISCONSIN

How Smooth is "Smooth"?

Right this minute suppose you had to tell an engineer, machine operator or inspector the degree of smoothness you want on a machined surface. Where would you turn? What would you do to illustrate—in positive, concrete terms—exactly what you mean by "smooth"?

Like threading a needle with mittens on, you'd find this a frustrating problem. But now, Baird Machine-Cut Surface Finish Standards, distributed by Blake, can provide you with a solution. Just as you would use "Jo" Blocks to check *linear* measurements, Baird Standards furnish you with a simple, accurate method of guaranteeing plant-wide *surface-quality* control . . . without guesswork! . . . without costly instruments! And Baird Standards are easy to use: just compare the "feel" as you draw your fingernail over the standards and the surfaces with which they are being matched . . . simple, accurate, foolproof!



Hundreds of plants are already using Baird Machine-Cut Surface Finish Standards to improve the looks and precision of their products while eliminating many costly second operations and rejects. Act now to count yourself among these leaders. Get all the details on Baird Machine-Cut Surface Finish Standards by writing for Bulletin 1048 *today*.

Edward Blake Company
437 Cherry Street
West Newton, Mass.

Please send Bulletin 1048 on the Baird Machine-Cut Surface Finish Standards.

Name ..... Date .....

Company .....

Address .....

City ..... State .....

Other Blake Products — for free literature check those you are interested in:

☐ Black Diamond Precision Drill Grinders ☐ Blake Tap Grinders
☐ Blake Flute Grinders ☐ Waltham Cutter Sharpeners
☐ Waltham Thread Millers ☐ American Tool Holders
☐ Surface Finish Standards

PHILLIPS

Rotomatic Vapor Degreaser

PHILLSOLV

CONVEYORIZED PERFORMANCE!

Controlled cleaning Cycle!
Open top degreaser cost!
Timed for proper cleaning!
75% reclamation of solvent!
Great economizer of labor!
No installation costs!

PHILLSOLV . . . the perfect cleaning solvent for all metals or combinations of metals. PHILLSOLV will not affect or stain highly polished surfaces.

ENGINEERED SERVICE

Send for FREE Booklet "Questions and Answers on Vapor Degreasing"

PHILLIPS MANUFACTURING CO.
3467 W. TOUHY AVE. CHICAGO 45, ILLINOIS

How to Work **MAGNESIUM ALLOYS**

MACHINING . . . CASTING & FORGING
JOINING . . . CLEANING & FINISHING
CHARACTERISTICS . . . SHEET WORKING

of this light-weight metal are thoroughly covered in *American Machinist's* special 16-page report, "How to Work Magnesium Alloys." Reprints are available at 10 cents per copy, postpaid. Order them today, while the supply lasts.

Ask for complete list of reprints in this series

READERS SERVICE DEPARTMENT

American Machinist

330 West 42nd Street • New York 18, N. Y.

MODERN TESTING METHODS— What they are... How to use them...

"Non-destructive Testing Methods", a 24-page *American Machinist* Special Report, gives all the facts on how to scientifically test parts, pieces, structural materials, rough castings, dies, and any other formed piece subject to defect.

This Special Report explains in detail the supersonic, radiographic, spectroscopic and magnetic methods of Inspection . . . points out how each can be used effectively. Illustrations, graphs, photographs, clarify the factual, authoritative text.

Non-destructive testing, recognized as the most practical way of checking on a production basis, is particularly important because a thorough check at all points is possible without damage to the part or material being tested. This compact, up-to-the-minute survey on non-destructive testing goes into the many new or improved methods used today, points out their particular advantages.

If you would like copies for distribution to your staff or for your own ready reference, we have a limited number available for distribution at 10¢ each.

Just write:

Reader Service Department

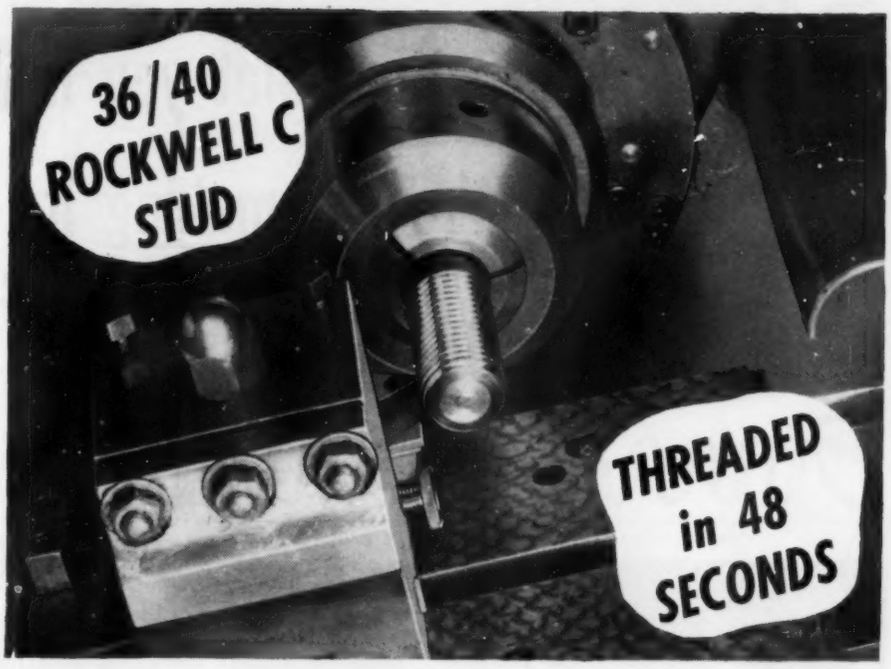
AMERICAN MACHINIST

Magazine of Metalworking Production

330 W. 42nd STREET
NEW YORK 18, N. Y.

TOUGH STUFF *threaded* FAST

AT LOW TOOL COST!



with the Cri-Dan single point carbide tool method, you too can . . .

1. Thread heat-treated parts speedily and at remarkably low tool cost.
2. Easily sharpen the carbide tool, or
3. Replace the tool in a few seconds, and
4. Readily modify the thread profile if desired.

If you have a tough thread grinding or thread milling job, and it is under 6-inch diameter, the Cri-Dan Single Point Threading Machine points the way to high speed production at extremely low tool cost. ***Write for Cri-Dan Bulletin 75-A.***

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

No matter what you make —you're not making it at a profit !

YOU MAY HAVE the finest product of its kind. Your production set-up may be a miracle of efficiency. Perhaps you've even discovered how to cut your cost-per-unit below that of your closest competition. The fact remains —

You're still not *making* anything at a profit. Because actually, of course, there is no such thing.

Goods can only be *sold* at a profit. And selling them profitably requires the same kind of mechanization that keeps your production costs down.

In the *manufacture of a sale*, for example, there are five basic operations —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Any good salesman can handle all five. But no salesman should *have* to — not when the first three can be mechanized so economically through the use of advertising.

For good advertising, like the machine on your production line, is a multiplier of individual effort, enabling all of us to produce (and *earn*) far more than we could alone.

And when it goes to work in *business papers* — with their tremendous concentration of hand-picked prospects — advertising becomes the most efficient machine available for manufacturing sales at a profit!

American Machinist

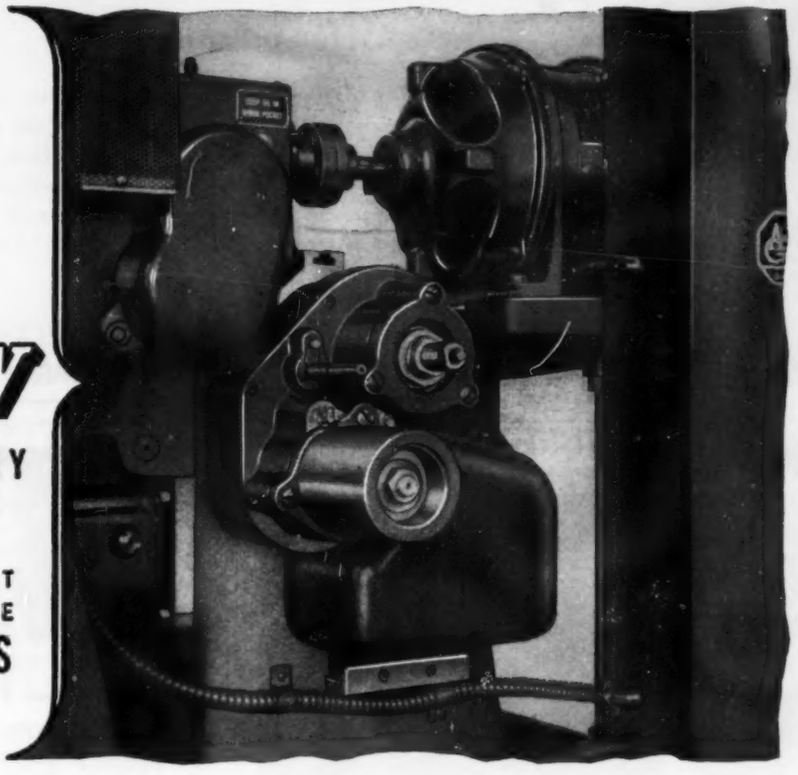
is a member of The Associated Business Papers, who have published an interesting folder entitled, "10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

Goss & DeLeeuw

MACHINE COMPANY
KENSINGTON, CONN.

★

THE WORLD'S FINEST
MULTIPLE SPINDLE
CHUCKING MACHINES



BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

60 YEARS MANUFACTURING

Multiple Spindle Drilling and Tapping Machines — Automatic Drilling and Tapping Units — Multiple Spindle Attachable Drill Heads—Hot and Cold Swaging Machines—Hammering Machines — Tools, Jigs & Fixtures — Contract Work — Special Machinery

LANGELIER MANUFACTURING COMPANY,
PROVIDENCE 7, RHODE ISLAND

Make a Time Study
OF
NICHOLSON EXPANDING MANDRELS

Time studies show that, with these widely used precision tools, operations can frequently be completed in less time than was formerly consumed in locating or turning a solid arbor. Set of 14 does work of 209 solid arbors. Two types. Sold singly or in sets; for bores ½" to 7". BULLETIN 1043.

W.H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

ECONOMY

THE W&B CO

ECONOMY Lubricant 1888
fluid type - water soluble
For Grinding and Cutting

Highly detergent—
assures open and free cutting wheels,
clean machines and parts

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Originators of Grinding Lubricants

WALTHAM SUB-PRESSES...

...for precision work

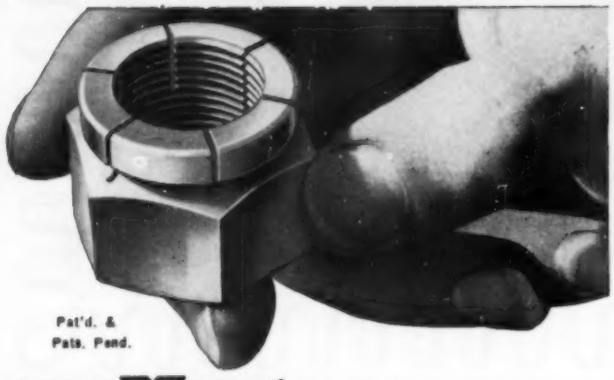
Arch Sub-Press

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang Sub-Press

WALTHAM MACHINE WORKS
HIGH STREET, WALTHAM, MASS.

ASK FOR SAMPLES



Pat'd. & Pats. Pend.

FLEXLOC ONE-PIECE SELF-LOCKING NUTS

The one-piece, all-metal, resilient "Flexloc" is becoming widely accepted, because it is processed to have an exceptionally uniform torque, and because it is a stop, a lock and a plain nut all in one.

All its threads are "live" and load-carrying; "Flexloc" accommodates itself to a wide range of thread tolerances, and can be used over and over again without losing much of its torque . . . is not affected by temperatures commonly met within the industrial field of Mechanical Engineering . . . and being a "stop" nut, it stays locked in any position on a threaded member . . . and last, but not least—it won't shake loose!

The *Thin* "Flexloc" has become very popular because its *tensile* is so high and the space it occupies so small.

Sizes from #6 to 2" in diameter—in "regular" and "thin" types—in NC and NF thread series. Write for *"Flexloc" Catalog.*

OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNSYLVANIA, BOX 4
Chicago • Detroit • St. Louis • San Francisco

PRESSES • FEEDS
AUTOMATIC EQUIPMENT
The V&O Press Company
HUDSON, NEW YORK

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
Write for Circular!

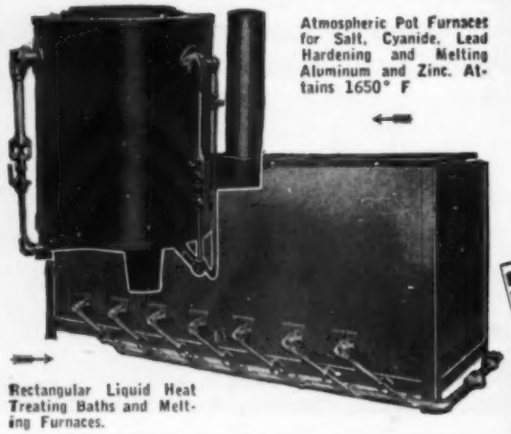
THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4070

HOLMAN *BETTER, FASTER HOLE FINISHING*

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

HOLMAN REAMER CO.
MANCHESTER, CONN.



Atmospheric Pot Furnaces for Salt, Cyanide, Lead Hardening and Melting Aluminum and Zinc. Attains 1650° F

Rectangular Liquid Heat Treating Baths and Melting Furnaces.

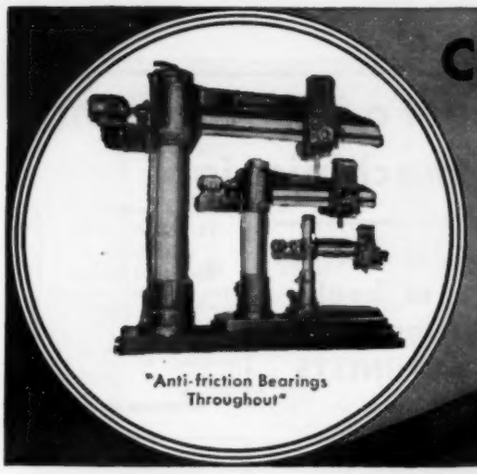
BUZZER Reg US Pat Off *Gas Fired* **FURNACES**

Heat Quickly to High Temperatures, without Blower, Power or other Auxiliary Equipment . . . just connect to your Gas Supply.

All "BUZZER" Industrial Gas Furnaces are rugged in construction, efficient in design, economical in operation and fully insulated.

The New BUZZER Catalog gives full details and information on wide range of models and sizes available for Heat Treating purposes, Burners and other equipment. Send for it today.

CHARLES A. HONES, INC.
121 South Grand Avenue, Baldwin, L. I., N. Y.



"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON MACHINE TOOL COMPANY

CINCINNATI 25, OHIO, U. S. A.

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

H&G DIE HEAD

See our Advt. on Page 260 Dec. 2, '48 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 334 N. San Pedro St., Los Angeles California.* Canada: *F. F. Barber Machinery Co., Toronto, Canada.*

ALMOND DRILL CHUCKS

Maximum Gripping Power with Extreme Accuracy and Long Life

Write for Catalog

T. R. ALMOND MFG. CO.

Ashburnham, Mass., U.S.A.

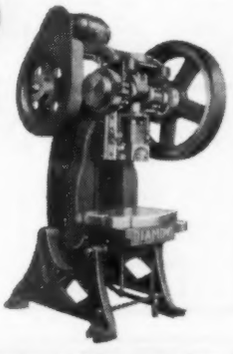
DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

DIAMOND *Punch Presses*



9 TON BENCH MODELS
TO 56 TON GEARED PRESSES

Write FOR COMPLETE CATALOG

DIAMOND MACHINE TOOL COMPANY
3419 EAST OLYMPIC BLVD., LOS ANGELES 23, CALIF.
OFFICE AND WAREHOUSE IN CHICAGO

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

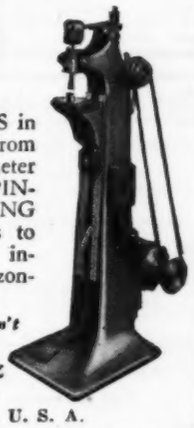
- Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

NATIONAL MACHINE TOOL CO.
CINCINNATI 22, OHIO

GRANT



RIVETERS — PIONEERS in their line—head rivets from smallest to ⅝" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

EDWARD **Blake** COMPANY

WEST NEWTON 65
MASSACHUSETTS

HIGH TAP COSTS?

. . . SAVE THESE 4 WAYS with BLAKE TAP GRINDERS

1. *Increase tap life up to 1200%*
2. *Cut tap costs by as much as 90%*
3. *Increase hole production 50% to 200%* . . . taps are sharper so they can be run faster . . . saves power, saves time
4. *Reduce work spoilage an average of 50%*

These advantages can be yours *only* when you use Blake Tap Grinders. So why put up with clumsy, costly hand-sharpening methods? Put a Blake on the job and pocket these important savings.

Get all the facts today—fill out and mail coupon below.

THE BLAKE TAP GRINDER

Fast! Versatile! Easy to operate! . . . sharpens any right or left hand tap with 2, 3, 4, 5, 6, 8 or 10 flutes . . . also sharpens many other tools requiring relief on the cutting edges. Clip and mail coupon for details.

A.M.

EDWARD BLAKE COMPANY
437 Cherry St., West Newton 65, Mass.
Please send me Catalog and full details on BLAKE TAP GRINDERS.

DATE_____

NAME_____

COMPANY_____

ADDRESS_____ STATE_____

CITY_____

BLACK DIAMOND PRECISION DRILL GRINDERS • BLAKE TAP GRINDERS • BLAKE FLUTE GRINDERS • WALTHAM CUTTER SHARPENERS • WALTHAM THREAD MILLERS • AMERICAN TOOL HOLDERS • SURFACE FINISH STANDARDS

How to get a better paying machinist job

Use the set of books that helps make MASTER MACHINISTS

HIGH-PAYING machinists' jobs are waiting for men who can handle them. Here's a sound guide that helps YOU fit into any one of these jobs. It gives you the practical knowledge of machine shop work that enables you to handle all kinds of jobs efficiently. You'll face work with confidence . . . plan and carry it out with better results . . . **you'll see advancements come your way.**

Shops throughout the country use this library. It answers questions on methods . . . the operation and repair of all types and sizes of machines for the range of metal cutting, forming and finishing operations.

TURNING AND BORING
Revised 3rd Edition
Gives you the essential principles involved in turning and boring operations . . . a clear picture of the kinds of machines in use and methods of operating them.

DRILLING AND SURFACING PRACTICE
Revised 3rd Edition
Up-to-the-minute information on drilling and surfacing tools, the machines in which they are used, and the methods of use which give best results.

THE MODERNIZED

AMERICAN MACHINISTS' LIBRARY

6 volumes, 2645 pages, 2747 illus.
Scores of charts and tables

GRINDING PRACTICE
How to use the right machine and method for each operation. New and valuable data added on the use of diamond abrasive wheels for cutting-off work, complete details on speed, wheel selection, precision grinding, etc.

GEAR CUTTING PRACTICE
Latest machines and methods for making gearing of different kinds and for checking accuracy. Includes all the standards adopted by the American Standard Association and by the American Gear Manufacturing Association.

PUNCHES AND DIES
Outlines the development of die design; discusses the use of metal stampings for complicated constructions, sectional dies and big press work, blanking operations, the use of cemented carbide dies in blanking, etc.

JIGS AND FIXTURES
Revised 5th Edition
Explains every aspect of the design and use of jigs and fixtures. Contains drawings of over 600 pieces available for adoption or adaptation. Emphasizes machines used, clamping methods, new standards for jig bushings, etc.

HERE'S the gist of more machine shop experience than you could amass in a lifetime of work . . . written by experts and made available in 6 compact volumes. You can check on your own methods, keep abreast of modern practices, solve problems right on the spot as they come up.

Guides You on All Types of Jobs

With this great guide, no job is too hard or unusual. The AMERICAN MACHINISTS' LIBRARY is so clearly and thoroughly indexed that you find in a jiffy answers to whatever problems may arise. With charts, diagrams, and pictures you're shown where to look for trouble . . . the characteristics . . . how to repair it . . . and the steps to take in order to keep machines operating smoothly and at top efficiency.

What this Library gives you:

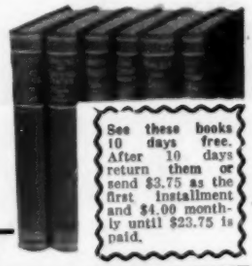
—complete guide for everybody, from shop executive to apprentice interested in the operation of machines

—descriptions of all important varieties of machines, both manual and automatic, and methods of operating them

—essentials of selecting machines, setting up work, and handling operations in reaming, tapping, planing shaping, slotting, milling and broaching, etc. etc.

NO MONEY DOWN

EASY PAYMENTS



See these books 10 days free. After 10 days return them or send $3.75 as the first installment and $4.00 monthly until $23.75 is paid.

See these books 10 Days Free

McGRAW-HILL BOOK CO., Inc., 330 W. 42d St., NYC 18

Send me the AMERICAN MACHINISTS' LIBRARY, 6 volumes, charges prepaid, for 10 days' examination. If I find the books satisfactory, I will send you $3.75 in 10 days, and $4.00 a month until a total of $23.75 has been paid. Otherwise, I will return the books postpaid.*

Name_____

Address_____

City_____ Zone_____ State_____

Company_____

Position_____ A 12-30-48

*We pay mailing costs if you send first payment with this coupon. Same return privilege.

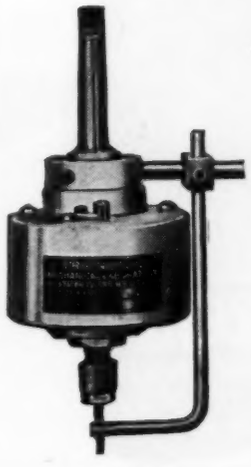
Save three ways with Grand Rapids No. BD-1 Combination Tap and Drill Grinder: 1. Lower first cost; 2. Less maintenance expense; 3. Valuable floor space.

Grand Rapids BD-1 combination Tap and Drill Grinder

Write for Bulletin GL-248

GALLMEYER & LIVINGSTON COMPANY
Manufacturers of Grand Rapids Grinders
330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

CUT SMALL HOLE TAPPING COST



With the *new* and *improved* ERRINGTON "Cushion" Cone High Speed Tapper with the 2:1 reverse.

Ball & Bronze bearing throughout.

Taps to 3/16 in steel, 1/4 in cast iron.

Also: Multiple drilling & tapping attachments, auto opening dieheads, clutch tappers to 2" taps.

Send for CATALOG

ERRINGTON MECHANICAL LAB.
Main Office & Wks.: STAPLETON, S. I. 4, N. Y.
Established 1891

Want to STEP UP PRODUCTION?

HERE'S HOW Korfund Vibration Control Will Help You . . .

Higher Machine Speeds — Removes speed limitation imposed by uncontrolled vibration.

Fewer Rejections — Eliminates vibration-caused work spoilage.

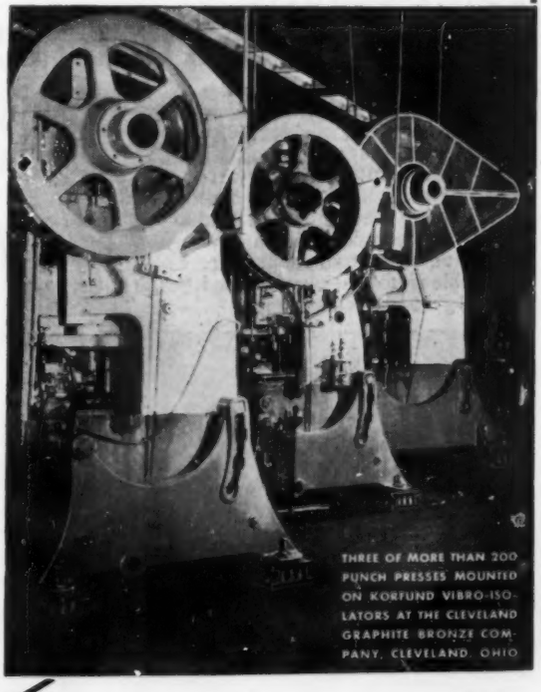
"In Line" Machine Arrangement — No longer necessary to break up normal work flow—precision grinders may now be located right next to hammers, punch presses!

Fewer Interruptions for Maintenance on machines and buildings.

Greater Employee Efficiency through relief from fatigue caused by vibration.

Korfund vibration control units are efficient, long-lived, easy to adjust. Standard units are available, with steel springs, rubber, or cork—or a combination—as the isolation medium. Thus you are assured of the right medium for your particular job.

Korfund makes vibration control easy, economical. Even if you have no serious problem, you will want to see a copy of "Vibration in Industry." It describes in detail how Korfund isolation overcomes the harmful effects of vibration. Write today for your free copy—ask for Catalog SP-650.



THREE OF MORE THAN 200 PUNCH PRESSES MOUNTED ON KORFUND VIBRO-ISOLATORS AT THE CLEVELAND GRAPHITE BRONZE COMPANY, CLEVELAND, OHIO

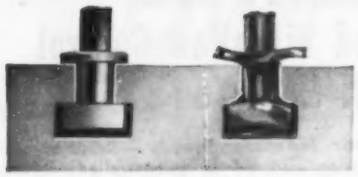
KORFUND VIBRATION CONTROL

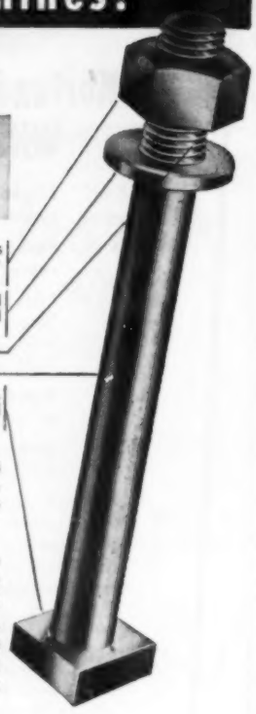
The **KORFUND COMPANY, INC.**

48-60 Thirty-Second Place
Long Island City 1, N. Y.

Vibration Control Specialists for Over 45 Years
Representatives in Principal Cities

Protect this VITAL PART of Your Machines!





NUT of alloy steel, heat treated with Class 3 fit thread, and washer face commercially square with threads.

WASHER heat treated steel, chamfered edges. Ground to uniform thickness and hardened.

THREADS Class 3 fit.

SHANK ground for accuracy.

HEAD Machined square with shank. Square, flat surface of head fits machined surface of T-slot

It is cheaper to use precision made bolts than to repair expensive machines. Poorly made bolts of soft steels can quickly ruin the accuracy of a machine.

Boyar-Schultz S. M. B. Bolts are made to protect the T-Slot. They are precision made from upset alloy steel forgings and threaded for a Class 3 fit. Use S. M. B. Nuts and Washers with S. M. B Bolts for firm, delicate adjustments. They hold work in exact position for heaviest machine cuts.

BOYAR-SCHULTZ

COPPER HEAD LAPS . . .

Economy and accuracy are the outstanding features of Copper Head Laps. They work rapidly. Only the replaceable copper sleeves wear out. Sleeve adjustment permits maintaining correct lapping size till worn out when it is replaced with a new one. Save costly tool room time. Available from stock in standard sizes, 1/8" to 2 1/2" Diameters.

BOYAR-SCHULTZ CORPORATION

2109 WALNUT ST., CHICAGO 12, ILL.

the "swing" is to

SPECIAL MACHINERY

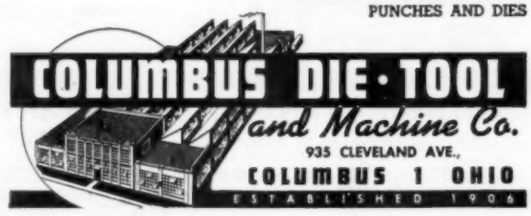
AND

the "orders" are going to—

"COLUMBUS DIE-TOOL"

Because we have specialized for years in designing and building single purpose machinery, our "know-how" is unequalled. WE HELP TO KEEP YOU AHEAD OF COMPETITION by designing the right machine for the job. Send us your machinery and tooling problems.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



COLUMBUS DIE·TOOL and Machine Co.
935 CLEVELAND AVE.,
COLUMBUS 1 OHIO
ESTABLISHED 1906

YES, Mr. Employer

Disabled Are Valuable

DISABLED AMERICAN VETERANS

IT'S GOOD BUSINESS TO EMPLOY DISABLED VETERANS

NATIONAL HEADQUARTERS—*Cincinnati, Ohio*

D.A. Stuart Oil Co. LIMITED
EST. 1865
2729 SOUTH TROY STREET, CHICAGO 23, ILL.

STUART *service goes with every barrel*

LAYOUT FLUID

Send for Your FREE Sample

For Machinists, Toolmakers, Diemakers, Model Makers, Template Makers and Layout Men—also for general machine shop and toolroom use on tools, dies, jigs and fixtures and machine surfaces, this Layout Fluid has a considerable advantage over the old copper sulphate method.

With the use of this Layout Fluid, you simply wipe the surface clean and brush it on. It dries instantly.

SEND FOR YOUR FREE SAMPLE of this Combination Brush-in-can. Please use your letterhead.

DAYTON ROGERS MFG. CO.
Minneapolis 7, Minnesota

The KALAMAZOO *Metal Cutting* BAND SAW

"TOPS" for Cutting Metal

If you want SPEED, ACCURACY and REDUCED PRODUCTION COSTS in cutting off metals to lengths this low cost tool makes a profitable investment.

Standard Model for intermittent cutting. Coolant Model (illustrated) for continuous production. Automatically cuts anything up to 8x16 inches, either solid, angular or tubular. Thousands of satisfied users.

Ask your dealer or ask for bulletin.

MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY
KALAMAZOO 16 MICHIGAN

American Steel Export Co., New York City

ANTON PARALLELS

- **123 Sizes In Stock For *Immediate Delivery***
- **ANTON PARALLELS ARE HARDENED TO 65 ROCKWELL "C"**
- **ANTON PARALLELS ARE FULLY GUARANTEED to be within the following tolerances in height (ground surfaces):**

Grade	Height	Parallelism and Straightness Over Full Length
Standard	±.001"	±.0001"
Precision	±.0001"	±.0001"

LIST OF STOCK SIZES AND PRICES PER PAIR OF ANTON PARALLELS

Length In.	Width In. x Height In.	Standard	Precision	Length In.	Width In. x Height In.	Standard	Precision	Length In.	Width In. x Height In.	Standard	Precision
6	1/4x 3/8	$4.36	$5.67	6	1/4x1- 3/4	$4.36	$5.67	6	1/2x1- 3/4	$6.50	$8.45
6	1/4x 7/16	4.36	5.67	6	1/4x1-13/16	4.36	5.67	6	1/2x1-13/16	6.50	8.45
6	1/4x 1/2	4.36	5.67	6	1/2x 1/2	6.50	8.45	6	3/4x1- 3/16	8.07	10.49
6	1/4x 9/16	4.36	5.67	6	1/2x 9/16	6.50	8.45	6	3/4x1- 1/4	8.07	10.49
6	1/4x 5/8	4.36	5.67	6	1/2x 5/8	6.50	8.45	6	3/4x1- 5/16	8.07	10.49
6	1/4x 11/16	4.36	5.67	6	1/2x 11/16	6.50	8.45	6	3/4x1- 3/8	8.07	10.49
6	1/4x 3/4	4.36	5.67	6	1/2x 3/4	6.50	8.45	6	3/4x1- 7/16	8.07	10.49
6	1/4x 13/16	4.36	5.67	6	1/2x 13/16	6.50	8.45	6	3/4x1- 1/2	8.07	10.49
6	1/4x 7/8	4.36	5.67	6	1/2x 7/8	6.50	8.45	6	3/4x1- 9/16	8.07	10.49
6	1/4x 15/16	4.36	5.67	6	1/2x 15/16	6.50	8.45	6	3/4x1- 5/8	8.07	10.49
6	1/4x1	4.36	5.67	6	1/2x1	6.50	8.45	6	3/4x1-11/16	8.07	10.49
6	1/4x1- 1/16	4.36	5.67	6	1/2x1- 1/16	6.50	8.45	6	3/4x1- 3/4	8.07	10.49
6	1/4x1- 1/8	4.36	5.67	6	1/2x1- 1/8	6.50	8.45	6	3/4x1-13/16	8.07	10.49
6	1/4x1- 3/16	4.36	5.67	6	1/2x1- 3/16	6.50	8.45	9	1/4x2		
6	1/4x1- 1/4	4.36	5.67	6	1/2x1- 1/4	6.50	8.45	9	1/4x2- 1/4		
6	1/4x1- 5/16	4.36	5.67	6	1/2x1- 5/16	6.50	8.45	•MAGNETIC CHUCK PARALLELS (Standard)			
6	1/4x1- 3/8	4.36	5.67	6	1/2x1- 3/8	6.50	8.45				
6	1/4x1- 7/16	4.36	5.67	6	1/2x1- 7/16	6.50	8.45	6	1/4x 1/2	PRICES FURNISHED ON REQUEST	
6	1/4x1- 1/2	4.36	5.67	6	1/2x1- 1/2	6.50	8.45	6	1/4x1-13/16		
6	1/4x1- 9/16	4.36	5.67	6	1/2x1- 9/16	6.50	8.45	6	1/2x1- 1/2		
6	1/4x1- 5/8	4.36	5.67	6	1/2x1- 5/8	6.50	8.45	6	3/4x1- 1/4		
6	1/4x1-11/16	4.36	5.67	6	1/2x1-11/16	6.50	8.45	9	2 1/4x3		

PRICES ON COMPLETE SETS OF PARALLELS
(In a Neat Wooden Container)

	1/4" Th. x 6" L. (22 Pairs)	1/2" Th. x 6" L. (11 Pairs)	3/4" Th. x 6" L. (11 Pairs)
	1/2" to 1-13/16" High Inclusive by 1/16"	1/2" to 1-1/8" and 1-3/16" to 1-3/16" High Inclusive by 1/16"	1-3/16" to 1-13/16" High Inclusive by 1/16"
STANDARD	$96.00	$71.00	$38.75
PRECISION	124.00	92.00*	115.00

All Prices are F.O.B. New York

ANTON MACHINE WORKS
52 Sands St., Brooklyn 1, N. Y. Tel. TRiangle 5-8092

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

Why you have a big stake in your company's advertising

NO MATTER WHAT your present job may be, your chances of getting ahead depend on your company's ability to make a fair profit.

As a production man, you have a pretty good idea of how profits are earned. You know that without modern, high-speed production tools, there wouldn't *be* any profits — or any jobs, for that matter. Your cost-per-unit would be so high that you couldn't compete with other manufacturers in your market.

The same thing applies to the *manufacture of a sale!* Without mechanization, the cost of "manufacturing" would be prohibitive.

That's where advertising comes into the picture. Because advertising is simply the assembly-line technique in selling. Just consider the five basic operations involved —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Advertising performs the first three of these jobs. And it performs them *far more economically* than any other means, leaving your salesmen free to concentrate on the two that they alone can do, and do best. In that way, advertising increases your company's chance to earn a profit. And that is why you have a big stake in its *efficient use.*

Where can your company's advertising work at its highest efficiency? Where but in those business papers which are concentrated among your company's best prospects — *and no one else!*

American Machinist

is a member of The Associated Business Papers, who have published an interesting folder entitled, "10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

Automatic Centerless Feed of cylindrical work means low cost FINISHING . . . on the No. 101 "PRODUCTION" POLISHING MACHINE

No centering, chucking or holding of work is required on this fast, high speed polishing machine. Work is fed automatically and any grade of finish can be attained at lowest costs.

Features include ball bearings, belt or motor drive, truing of wheel while in motion, centerless feed and all parts carefully guarded yet readily accessible.

SEE OUR EXHIBIT—
SPACE 1327
NATIONAL METAL
EXPOSITION
PHILA., OCT. 25-29.

Production
MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

LUERS

Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economicaly on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

Straight Side Press

ZEH & HAHNEMANN CO.
NEWARK N. J.
180 Vanderpool Street

the button does it

at last—

Air Gaging that Coincides with Mechanical Checking

Merz *New-Matic* Measuring Machines—and only Merz—give you air gaging that coincides *exactly* with mechanical checking. THE EXCLUSIVE SAPPHIRE BUTTON DOES IT! In Merz *New-Matic* Measuring Machines air pressure is metered *only* by the *Sapphire* spindle button. Only the *Sapphire* button contacts the surface measured. Thus, only the *actual* dimension is measured—readings are totally unaffected by surface variations, perforations, key ways, etc. Now—for the first time ever—you can have all the speed and ease of air gaging with precision accuracy that equals or excels mechanical checking. Now you can place air gages and mechanical gages side-by-side on your production lines—and get identical readings, every time! Let your Merz gaging specialist give you a demonstration—*in your own plant, on your own work.* Write today!

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, INDIANA

MERZ

New-Matic Measuring Machines — New-Tronic Comparators and Sorting Machines—Standard A.G.D. and Special Gages—Tools—Special Machinery—Experimental Projects.

A Quick, Smooth, Uniform coating—assured by
BARRETT GALVANIZING AND HOT TINNING CENTRIFUGALS

BARRETT CENTRIFUGAL GALVANIZER is driven with high torque head and has an equalized disc brake for quick stop.

With the Barrett Whizo Galvanizer, excess metal is quickly removed from small parts after dipping in molten metal, in fact, much faster and more uniform production is assured. Parts will also pass the most rigid inspection for quality.

The method of handling is simple and easy. Work to be coated is placed in a round basket and submerged in molten metal. When thoroughly heated, the basket is placed in the Barrett Centrifugal to be immediately accelerated to high speed, the excess metal being thrown off before it can cool.

A quick pick up and stop (from 2 to 3 seconds each) assures maximum production with an even thickness of coating.

Machines furnished with or without heated surrounding drum, in capacities from 40 to 240 loads per hour, handling from 5 to 100 lb. loads. When used for tinning threaded work, rethreading has been found to be unnecessary.

Barrett Centrifugals are used extensively, combine speed with convenience of operation and the utmost in safety. They are highly developed to meet all reasonable requirements, have self-contained motor drive and occupy a minimum of floor space.

Send at once for full details of Barrett Centrifugal Galvanizer

THE LEON J. BARRETT COMPANY 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

PUBLIC AUCTION

ON THE PREMISES

CLARK ELECTRIC CO.
1207 N. 7th STREET

BEDFORD, INDIANA.

STARTING PROMPTLY

AT 11:00 A.M.

TUESDAY JANUARY 11th, 1949

EXHIBITION JAN. 3 TO DAY OF SALE

REPRESENTING APPROXIMATELY **$500,000.00** REPLACEMENT VALUE

ELECTRIC MOTOR MANUFACTURING MATERIALS,
METAL WORKING MACHINERY, TOOLS
FACTORY EQUIPMENT • OFFICE FURNITURE

All Go Under the Hammer in Individual Lots and Parcels

MACHINERY

PEXTO 12'—10 GAUGE CAPACITY.
ELECTRIC POWER SHEAR.
LeBLOND & GISHOLT LATHES.
PUNCH PRESSES, GRINDERS.
HYDRAULIC PRESSES, SLOTTERS.
ROTOR BALANCING MACHINES.
COIL WINDERS, DRILL PRESSES.
GISHOLT DYNETIC BALANCER.
GENERATORS, AIR COMPRESSORS.
DIE FILERS, ELEC. CHAIN HOISTS, etc.
215 FT. FOSTORIA MONORAIL CONVEYOR.

We Will Also Offer For Sale All PATENTS, DIES, JIGS, & MOLDS.

MATERIALS

- 75 TON OF COPPER WIRE
- 150 TON SHEET STEEL
- 50 TON ¾" & 15/16"x20' SHAFTING
- 50 M. DUST SHIELD BEARINGS
- 15000 CAPACITATORS
- 7000 LBS. INSULATING PAPER

SLOT WEDGES • END BELL CASTINGS
MOTOR HOUSINGS • 6000 STATORS
3000 BUSHINGS
COPPER WASHERS & SHEETS

FOR DESCRIPTIVE CIRCULAR PHONE, WIRE OR WRITE

COVER & CANTOR CO.
Auctioneers
309 W. MADISON ST. CHICAGO 6, ILLINOIS ANdover 3-6305

CONTRACT WORK

The Lowest Possible Die Cost For...

STAMPINGS

IN SMALL LOTS

DAYTON ROGERS MFG. CO.
Minneapolis 7, Minnesota

PREMIER MILL CORP.
GENEVA, N. Y.

Facilities available for production manufacturing of small precision parts; building and assembling special machines, small tools, jigs, fixtures, etc. Experience in special alloys such as Stainless Steel, Hastelloy, Ni-Resist, etc. *Inquiries Welcomed.*

Equipment List Sent on Request

KAMIS Engineering Company

Designers & Manufacturers of Tools & Machinery

Special machine work; facilities available for production quantities of small, medium and large machined parts, assemblies and fabrications. Specializing in stainless steel aviation gas turbine parts.

Send for Brochure No. 3 which describes our facilities in detail.

300 MOORE STREET
PHILADELPHIA 48, PA.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

F. F. SLOCOMB CORPORATION
Wilmington 99, Delaware

Builders of Special Machines a Specialty. Facilities Available for Production. Quantities of Small and Medium Precision Parts.

Equipment List on Request

MACHINE WORK WANTED

Open facilities for long and short run jobs for Brown & Sharpe automatic screw machines and all sizes turret lathes.

PHOENIX SCREW MACHINE CO.
510 SOUTH AVE., GARWOOD, N. J.
Westfield 2-0819

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

REPLIES (Box No.):
Address to office nearest you.
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

TOOL DESIGNER—Chattanooga. Should have minimum of five years experience with single and multiple spindle screw machine tools. Some jig and fixture experience also desirable. Write full details of qualifications. Enclose photo (non-returnable). P-7142, American Machinist.

SELLING OPPORTUNITY OFFERED

WANTED A person with connections, who can secure work for old established manufacturers of special machinery and tools. Also have own wood or metal pattern shop. Commission or share of profits without investments. RW-7178, American Machinist.

EMPLOYMENT SERVICE

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service. 39 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dunn Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

MACHINE SHOP Supt. Background. 20 years experience—medium to medium heavy machinery. Charge of mfg. and assembly, also labor relations. Good record. Reliable. Efficient. Desires position with small or medium size company. PW-6994, American Machinist.

TO THE Machine Tool Manufacturer who needs a factory man on the West Coast. Sales Engineer, college, machine shop and drafting background, 8 years machine tool sales, well known to the trade. May I furnish you with full particulars? PW-7421, American Machinist.

EXCEPTIONAL OPENING FOR

SALES ENGINEER

to cover Mid-West Metalworking Industry

Selling Experience Desirable But Not Essential

Nationally known manufacturer of fastening devices wants man to advise customers on applications—not take orders—working in mid-west with headquarters preferably in St. Louis or Kansas City. Salary to be commensurate with experience.

Requirements: Varied knowledge of metalworking production gained by plant work or selling; ability to travel extensively away from home. Write in detail about background. Interview arranged at New York headquarters; expenses paid.

S.W.-7307, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

STRUCTURAL-ENGINEER with many years experience in stress analysis wants position. Excellent references. Answer PW-7355, American Machinist.

PATENT ATTORNEY

Patent Practice

before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel, Registered Patent Attorneys. Suite 453, 815-15th Street, N. W. Washington 5, D. C.

NEW ADVERTISEMENTS

Copy received by December 27th will appear in the January 13th issue.

WANTED

WANTED

1—20 to 25' Boring Mill.
1—8' Vertical—11' Horizontal Planer Type Mill.
1—8' Radial Drill.
1—50 ton 75' span Crane.

W-7283, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

WANTED

Several PRATT & WHITNEY 30" or 40" Single Spindle. Profilers (Vertical Millers)
Several #4 or 5 KEARNEY & TRECKER Vertical Millers (late type)

W-7219, AMERICAN MACHINIST
330 W. 42nd ST., NEW YORK 18, N. Y.

WANTED

10' x 1/2" press brake
8' x 1/2" gate shear
Cincinnati or equivalent
State price and delivery

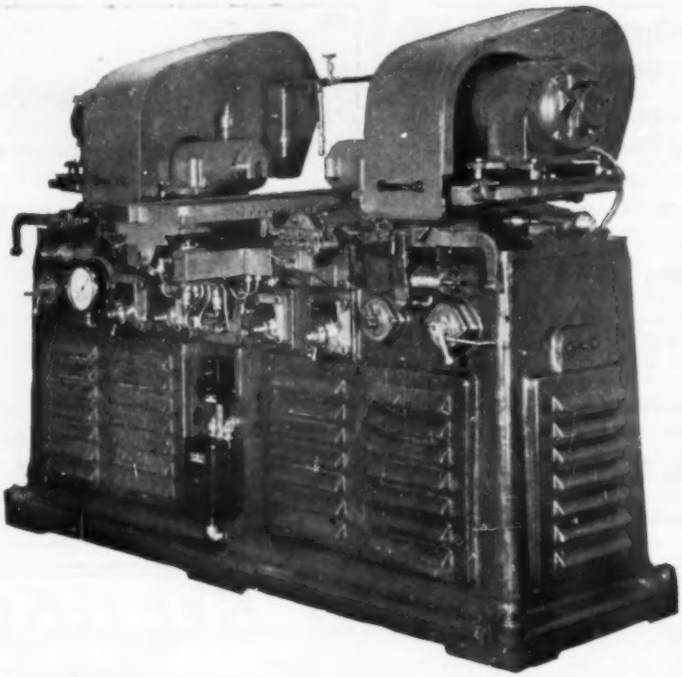
W-7373, AMERICAN MACHINIST
68 Post St., San Francisco 4, Calif.

WANTED

One used NX-628 Pantagraph Truing Device for J & L Thread Grinder.

BOX 910 **DECATUR, ILL.**

EMERMAN OFFERS FROM STOCK



NEW

BRIDGEPORT HYDRAULIC DUAL SPLINE MILLING MACHINES TYPE HD-SM-1

Table travel 0" to 12"
Distance from table to center of splines 4"
Maximum depth of cut—using both spindles 6"
Maximum depth of cut—using one spindle 3"
Maximum length of cut—plus diameter of cutter 12"
Spindle feeds 0" to .030"
Spindle speeds, 290-550-1025-1925
Number of table feeds per length of stroke—infinite
Work surface of table 6" x 32"
Maximum cutting diameter ¾"
Independent spindle adjustment 2"
Maximum between ends of spindles 12"
Minimum between ends of spinales 0"
Table strokes per minute 0" to 110"
Position adjustment of table 12"
Hydraulic feed to table & heads. Vickers pump & control
Driven by 3 HP General Electric 3 Phase 60 Cycle 220/440 Volt 1725 RPM Motor
Electric motors for spindle drive 2—1½ HP Diehl, 3 phase 60 cycle 220/440 Volt 1140 RPM Motors
Coolant system electric motor ¼ HP
Net weight of machine 3,600 lbs.

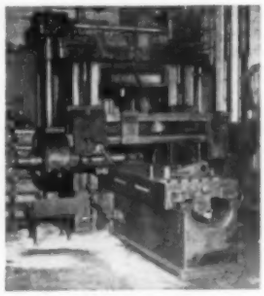
EMERMAN MACHINERY CORP.

875 W. 120th ST.
CHICAGO 43, ILL.

REYNOLDS

OF PROVIDENCE

OFFERS THIS — BECKER PLANER TYPE HORIZONTAL MILLER



Table—30" wide x 8' long. Width between Uprights 36". Height from Table to Center of Arbor Max. 22". 25 HP—220/3/60 Motor.

BARGAIN $1750.00

f.o.b. PROVIDENCE

REYNOLDS

MACHINERY COMPANY

305 Eddy Street
Providence 3, R. I.
Telephone JAckson 8900

NEW—SURPLUS

HIGH SPEED DRILLS

TAPER OR STRAIGHT SHANK

½"	$1.41 ea.	49/64"	$3.09 ea.
33/64"	1.55 ea.	25/32"	3.09 ea.
17/32"	1.55 ea.	51/64"	3.45 ea.
35/64"	1.79 ea.	13/16"	3.45 ea.
9/16"	1.79 ea.	53/64"	3.64 ea.
37/64"	1.90 ea.	27/32"	3.64 ea.
19/32"	1.90 ea.	55/64"	3.83 ea.
39/64"	2.02 ea.	⅞"	3.83 ea.
5/8"	2.02 ea.	57/64"	4.02 ea.
41/64"	2.26 ea.	29/32"	4.02 ea.
21/32"	2.26 ea.	59/64"	4.21 ea.
43/64"	2.50 ea.	15/16"	4.21 ea.
11/16"	2.50 ea.	61/64"	4.59 ea.
45/64"	2.74 ea.	31/32"	4.59 ea.
23/32"	2.74 ea.	63/64"	4.87 ea.
47/64"	2.97 ea.	1"	4.87 ea.
¾"	2.97 ea.		

12 or more drills — 10% discount

VICTOR MACHINERY EXCHANGE, INC.

251 Centre St., New York 13, N. Y.
CAnal 6-5575

UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36", Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10—16"x6', 8', 10'—18"x6', 8', 10'—20"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized
Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound [illegible] rack and pinion feed to carriage; 16" heavy [illegible] jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.

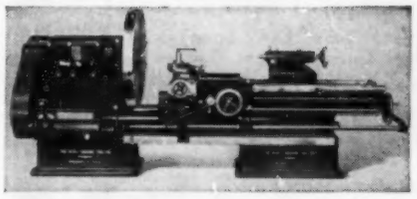
P. O. Box 88, Columbus 16, Ohio

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



Nebel 20"-40"x8' Geared Head Quick Change Gear Extension Bed Gap Lathe. 3/60/220 volts motor driven. Taper Attachment, faceplates, chuck, tailstock, plus Hexagon Turret with power feed. Immediate delivery.

ENGINE LATHES

36"x30' LeBlond Geared Hd. Motor Dr.
32"x16' Bridgeford, Geared Head, M. Dr.
28"x10' Davis Quick Change Gear
26"x18' Bridgeford, Geared Head, M. Dr.
25"x14' LeBlond Motorized
24"x18' American Q.C.G. Grd. Hd. 11' centers, Taper Attach. Motor Dr. Equipment
24"x14' Lodge & Shipley, Motorized
24"x16' American Motorized
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
21"x18' LeBlond, Motorized
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20'x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x8' Davis Q.C.G. 42" centers, equipment
18"x8' Lodge & Shipley, geared head
18"x8' Hendey Q.C.G. 49" centers
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, M.D.
16"x8' Hendey Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head
14"x8' Rockford, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
13"x5' South Bend Q.C.G. 30" centers
12"x30" American Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey Q.C.G. M. Drive
12"x5' Hendey Motorized. Taper & Collets.
12"x5' Sebastian Q.C.G. Grd. Hd.
12"x5' Mulliner Motorized. Taper Att.
12"x3' Craftsman, Bench, M. Drive
12"x18" Porter-Cable Carbo-Lathe
11"x4' Sidney, Q.C.G. Floor Type

TURRET LATHES

Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed, 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Gisholt #4 Univ. 2" cap., M. Dr.
W-Swasey #2A Univ. 2½" Cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.

Buffalo #0 Bending Rolls. Pinch Type, motor driven. With formers for bending angles, rounds, squares, pipe.
Buffalo #1 Wrapping Rolls. Motor driven. Capacity—3½x3/8x9
Niagara Initial Type. 12'x⅛" capacity.

METAL ROUTERS

Onsrud Double Spindle Radial Arm #A2DD 108" Arms with frequency Converter for 3/60/220
Onsrud #W-255 Universal Heavy Duty Single Spindle Router, with all steel table 54"x36" with T-slotted edges.

Porter-Cable 12"x18" Mechanical CARBO-LATHE. Semi-Automatic. 63 spindle speeds, 95 to 1130 r.p.m. Collet capacity —1". 3/60/220 volts motor drive.

GRINDING MACHINES

J & L #TG-615 Automatic Thread, M. Dr.
Norton 6x18 Vert. Surface, Excello Spindle
Norton 6x18 Horiz. Surface, Excello Spindle
Brown & Sharpe #2 Auto. Surface, 6x18
Pratt & Whitney 14x36 Vertical Surface
Blanchard #16, 30" Vertical Surface
Thompson Hydraulic Horiz. Surface
Abrasive Automatic Surface, 22x8
Reid #2 Automatic Surface, 6x18
Norton Hydraulic Horiz. 6x36
Heald #25 Rotary Surface
New Leach 6x12 Horiz. Surface, 3/60/220 volts
Brown & Sharpe #2 Face, motorized
Rivet #3 Internal, Cone driven
Heald #70 Internal, Belt drive
Heald #60 Internal, Belt drive
Norton #2 Univ. Tool & Cutter, Belt Dr.
Cincinnati #1½ Univ. Tool & Cutter, Belt Dr.
Oakley #3 Tool & Cutter, Belt Dr.
G & Livingston #4 Tool & Cutter
Cincinnati #2 Tool & Cutter, M. Dr.
Cincinnati "Monoset" Tool & Cutter
Cincinnati #2 Centerless, m. Dr.
Gorton Dble. End Disc, 18" dia. discs
Besley Dbl. End Disc, 30" dia. discs
Greenfield #12 Internal Hydraulic
Cincinnati #2 Univ. Cylindrical 6x36
Brown & Sharpe #10 Cylindrical 6x18
Brown & Sharpe #11 Cylindrical 10x30
Brown & Sharpe #4 Univ. Cylindrical 12x60
Brown & Sharpe #5 Plain Cylindrical
Oliver of Adrian #51 Drill Grinders

AUTOMATICS

No. 0 & No. 00 Brown & Sharpe
No. 0 Brown & Sharpe Automatic Cutoff
#2 Brown & Sharpe High Speed Automatic. Turner Drive.
1—1¼" Cone 4-spindle Automatic M.D. Threading Spindle
Cleveland Model "A" 3¼" Single Spindle. Motor driven.

PUNCH PRESSES

Caldwell 200 tons Horiz. Hydr. Wheel Press.
Ferracute #86 Wide Frame, motor driven. 61½" between housings. 1¾" stroke.
Ferracute No. EG52 Coining Press. 150 tons.
General Flexible Power Press. 8 tons, M. Dr.
Stiles O.B.I. 14 tons, 1½" stroke.
Michigan O.B.I. 36 tons cap. 2" stroke. Wide Ram, wide Bed. Motor driven
Bliss No. 68C Dbl. Action, Gap Frame.
Lucas 15 tons, Power Arbor Press. M. Dr.
Hub O.B.I. 15 tons, 2" stroke, M. Dr.
Tompkins & Johnson Power Arbor Press.
McCall No. 4 O.B.I. 2½" stroke, 25 tons.
NEW Johnson O.B.I. Presses. All sizes.
Bliss #305 Geared S.S. Single Action
Nilson 56 tons S.S. Dbl. Crank 3-Die Transfer Press
Bliss #18, #20, #20B, O.B.I. Motorized
Rousselle #15 Horn Press. Motor Driven

SHEARS

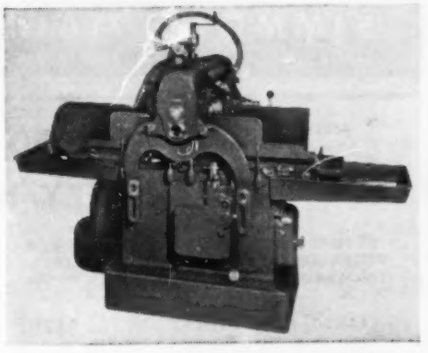
Bliss #109 Slitter, 10 ga. cap.
Pexto #571 Slitter, 3/16" cap.
Wais & Roos 10' x ¼", 15' gap.
NEW Famco 36"x18 ga. Squaring
Pexto Foot squaring 30" x 22 ga.

GEAR CUTTERS

Fellows #72 High Speed Gear Shaper, Internal & external, Motor driven
Fellows #7 High Speed Gear Shaper, External, Motor driven
Brown & Sharpe #3—36 Automatic Gear Cutter, 36" dia. Motor driven
Brown & Sharpe #34 Gear Hobber. 5" dia. Motor driven
Barber-Colman #3 Gear Hobber, 5" dia. 7" face, Motor driven
Whiton #1 Automatic Gear Cutter, 34" dia. 7" face, Motor driven
Adams #1 Gear Hobber, 14" dia. 6" face, Motor driven

MILLING MACHINES

Vernon #0 Hand, Late Type, M.D.
Nichols Hand, Late Type, M.D.
Sundstrand #0 Rigidmil, M.D.
Whitney #6 Hand, Cone Drive
Hardinge S.B. Vertical, Bench
Bickett #1 S.B. Vertical, Bench
Ames Universal Horiz. Bench
Becker #5C Vertical, Cone Dr.
Knight #1½C Vertical
Cincinnati #3 & #4 Vertical
Cincinnati #2 Univ. Horizontal
Cincinnati #3S Univ., Horizontal
Cincinnati #3, #4, #5 Pl. Horiz.
Cincinnati #2M Univ. Horiz.
Brown & Sharpe #12 Production. 18" Autom.
Brown & Sharpe #12 Production. 24" Autom.
Brown & Sharpe #0, 1, 1Y Horizontal
Brown & Sharpe #2 Univ. Horiz.
Brown & Sharpe #1D Univ. Horiz.
Brown & Sharpe #3 Univ. Horiz.
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain
Milwaukee #2K Vertical, M. Dr.
Milwaukee #3K Vertical, M. Dr.
Milwaukee #1½ Dbl. Overarm, Horiz.
Milwaukee #2B Dbl. Overarm, Horiz.
Milwaukee #2B Universal Horiz.
Milwaukee #3B Plain Horizontal
Pratt & Whitney #2 Duplex, Motorized
Van Norman #2 Duplex, Motorized
Cincinnati #0-8 Vertical, M. Dr.
Cincinnati #0-8 Plain Automatic
Cincinnati #0-8 Rise & Fall
Cincinnati #2-18 Plain Automatic



Cincinnati #2-18 Automatic Horizontal Milling Machine. Late Type, Motor driven with motor and controls. Motor driven coolant system. NINE AVAILABLE.

SHAPERS & PLANERS

Shaper—Logan 7" Horizontal. NEW
Shaper—Machinery Sales 16", motorized
Shaper—Gould & Eberhardt 16", motorized
Shaper—Smith & Mills 16", motorized
Shaper—Smith & Mills 16" Universal
Shaper—Potter & Johnston 16", Universal
Shaper—Gould & Eberhardt 18" B.G. Crank
Shaper—American 24" crank, motorized
Shaper—Columbia 32" B.G. Crank. Gearbox
New Haven 12" Slotter, motorized
Planer—Whitcombe 24x24x6 motorized
Planer—Shaper—Niles-B. Pond 20x20x24
Planer—Betts 72x60x30 Modern 4-Head
Planer—Betts 72x60x25 Modern 4-Head
Planer—Betts 122x72x34 Modern 4-Head

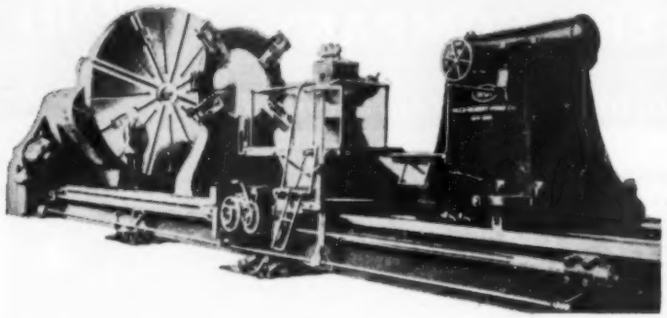
DRILLING MACHINES

American 8' Triple Purpose Radial, M. Dr.
Cinci-Bickford 6' Arm, 15" col. Radial
Cinci-Bickford 5' Arm, 13" col. Radial
American 4' Triple Purpose Radial, M. Dr.
Fosdick 5" Arm 14" col. Radial
Demco 4-Spindle Drill #2 M. T. M. Dr.
Natco #12, 20 Spdle. Multiple, 3/16" cap
Minster #2D Single Spindle Upright Heavy Duty 2½" cap. Compound Table. Motorized
Canedy-Otto 21" Single Spdle. Late Type
Cinci-Bickford 21" Drilling & Topping, #3 m.t.
Buffalo Forge #2MS Drill. Late Type
Barnes 22" Backgeared Upright Single Spdle.
Leland-Gifford #2MS, 2-Spindle Upright
Edlund #2B, 4-Spindle Upright, #2 m.t.
NEW Buffalo Forge #15, #18 Single Spdles.

ENGINEERED REBUILT MACHINE TOOLS

BUILT MACHINE TOOLS ENGINEERED REBUILT

14' x 50' (34' centers) NILES LATHE



14' x 50' (34' centers) NILES SCREW CUTTING ENGINE LATHE, Power rapid traverse to carriage, compound rest. Arranged for motor drive.

SPECIFICATIONS:

Max. swing over ways	174"
Swing over carriage, gap piece out	153"
Swing over carriage, gap piece in	138"
Takes between centers, max.	408"
Steel spindle bearings, front	22"
Steel spindle bearings, rear	14"
Diameter of face plate	144"
Face of steel internal driven gear	8"
Carriage bearing on ways	88"
Feeds 27; range per RPM	.010 to .400
Threading range	.100 to 4"
Steady rest range, dia.	28" to 50"
Tailstock bearing on bed	87" x 72"
Tailstock spindle 12"; adjustment	24"
Speed range, RPM	.233 to 23
Lead screw diameter	3⅞"

EQUIPMENT:

Main drive motor, power rapid traverse motor and motor for moving tailstock. Compound rest, four face plate chuck jaws, steady rest.
Net weight, appx. (lbs.) 190,000
Boxed wgt. appx. (lbs.) 210,000

FOR IMMEDIATE SHIPMENT!

- 5" Niles Horizontal Boring, Milling and Threading Machine, Late Type
- 36" x 24' Niles "Timesaver" Geared Head, Engine Lathe
- 36-44" Niles Vertical Turret Lathe with side head
- 24" Bullard "NEW ERA" Spiral Drive Vertical Turret Lathe
- 26" Libby Turret Lathe, 7½" Hole, Thread Cutting
- 2½" Spl. Cleveland Horizontal Boring, Table 20" x 42"
- 32" Cincinnati Shaper
- 18" and 24" NEW Simmons Shaper
- No. 2 and 3 Brown-Sharpe Universal Millers
- No. 1 NEW Simmons Plain Miller
- 6" Pratt-Whitney Vertical Shaper
- #70 Heald Internal Grinder, 3-Motors
- No. 2 NEW 1¼" Simmons B.G. Turret Lathes
- #36-H Gould & Eberhardt Gear Hobber
- 12' Pneumatic Flanging Clamp

SIMMONS MACHINE TOOL CORPORATION
MAIN OFFICE AND PLANT 1759 N. BROADWAY, ALBANY 1, N. Y. NEW YORK OFFICE 50 EAST 42ND STREET
ENGINEERED Machine Tool REBUILDING

ADVERTISED PRICES ON PRACTICALLY NEW MACHINES

(1) THOMAS #7 HEAVY DUTY POWER SQUARING SHEAR, 8'x5/16" CAPACITY. Purchased new in 1946. Actual use six months. PRICE $4,950.00

(1) STAMCO PRESS BRAKE, 126"x12' GAGE, Toggle Arm Type, Excellent Condition. PRICE $3,500.00

(2) #2G BROWN & SHARPE AUTOMATIC SCREW MACHINES, with 1⅛" High Speed Spindle. Excellent Condition. PRICE ..... $4,000.00 ea.

(1) LANDIS ⅞" BOLT THREADER, with practically new Landis head, (will take up to 1½"). Purchased new in 1946. PRICE $1,150.00

(1) 50 TON LAKE ERIE HORIZONTAL HYDRAULIC PRESS, Type C Frame, Excellent Condition. PRICE $1,000.00

(1) 200 TON HYDRAULIC STRAIGHTENING PRESS, Mfg. by Hydraulic Press Mfg. Co., Length of Bed 240", Width 24", Clearance Between Rods 30", Excellent Condition. PRICE. $4,500.00

(1) #3 BARBER-COLMAN HOB GRINDER, Excellent Condition. PRICE $1,500.00

(1) VINCO INVOLUTE GEAR CHECKER, Complete with all equipment, and involute master. Excellent Condition. PRICE $1,450.00

(2) PRATT & WHITNEY 9" GEAR GRINDERS. Excellent Condition. PRICE ..... $1,000.00 ea.

(2) DETROIT GEAR GRINDERS, Model GG-19, Excellent Condition. PRICE ..... $1,150.00 ea.

(1) ILLINOIS GEAR CHECKER, MODEL #337, Diameter 12", 42" Between Centers. PRICE $1,250.00

(6) CLEVELAND RIGIDTURNERS, MODEL NO. 616, Excellent Condition. PRICE $2,000.00 ea.

(1) #75-A HEALD INTERNAL GRINDER, Serial #22065. PRICE $2,250.00

(2) #74 HEALD INTERNAL GRINDERS, Serial Nos. 24802 and 24803. PRICE ..... $2,250.00 ea.

(2) TURCHAN FOLLOWERS FOR BULLARD BORING MILLS. PRICE ..... $1,000.00 ea.

(1) TURCHAN FOLLOWER FOR MONARCH ENGINE LATHE. PRICE $1,000.00

(1) #4 GISHOLT RAM TYPE TURRET LATHE, With Bar Feed, Chuck and some tooling. PRICE $3,250.00

(1) FOSDICK FOUR SPINDLE DRILL PRESS, Model #4BM, With #2 Taper. Excellent Condition. PRICE $2,250.00

MONA MEMBER **WINSTON MACHINERY COMPANY, Inc.**
517-23 SOUTH DELAWARE STREET, INDIANAPOLIS 4, IND.

PLANERS

48"x48"x12' Cincinnati Rapid Traverse, 4 heads
36"x36"x12' Woodward & Powell, 4 heads
32"x32"x10' Whitcomb, 2 heads
24"x24"x10' Whitcomb, 2 heads
Older Type machines, in excellent condition

HAZARD BROWNELL
350 Waterman St., Providence 6, R.I.
Dexter 8880

MILLERS FOR SALE

BRIGGS Type 2A 18" feed Hyd. Latest
BROWN & SHARPE #13 Plain Auto. Motor Drive
BROWN & SHARPE #21 Plain Auto. MD
CINCINNATI #3, #4 Plain rect. overarm MD
CINCINNATI 24" Duplex Timken MD
CINCINNATI #3, #4 Vertical MD
HALL Style D Planetary Latest
INGERSOLL 30x24x12' Planer Type MD
KEARNEY & TRECKER #4 Heavy Timken MD
LEBLOND #4 Plain Belted MD
SUNDSTRAND Model 3A Vertical Rotary Latest
SUNDSTRAND #3 Profile & Channel Latest
SUNDSTRAND Model 3A Duplex Timken Latest
VAN NORMAN #3 Duplex Universal MD

HARRISON MACHINERY EXCHANGE, INC.
South 4th St. Harrison, N. J.
Tel.: HUMBOLDT 2-5750, 2-5775

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT – GUARANTEED
MONA MEMBER
JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

SHEET METAL MACHINERY

NEW and USED — HAND and POWER. Apron Brakes, Press Brakes, Shears, Forming Rolls, Power Presses, Pittsburgh Lock Machines, Spinning Lathes, Spot Welders, etc.
MONA MEMBER **B. D. BROOKS, INC**
361 Atlantic Ave., Boston 10, Mass.

FOR SALE — *Ready for Use*

Barnesdril—#307 Single Spindle Hydraulic Honing Machine
Planer—36"x36"x12' Niles-Bement-Pond

THE VIMALERT COMPANY, LTD.
Jersey City 5, N. J. Delaware 3-6400

EASTERN REBUILT MACHINERY IS DEPENDABLE

—GUARANTEED TO SATISFY—

PLAIN CYLINDRICAL GRINDERS

3x18" No. 5 Brown & Sharpe, m.d., latest
No. 10 Brown & Sharpe Self-Contained, m.d.
No. 11 Brown & Sharpe Self-Contained, m.d.
6x18" Cincinnati Hydraulic, m.d.
6x18" Landis Type C Hydraulic, m.d., late
6x18" Landis Self-Contained, m.d.
6x30" Cincinnati Hydraulic model EA, m.d., late
6x32" Fitchburg Type A, m.d., latest
8x18" Cincinnati Saddle Type, m.d.
8x36" Cincinnati Saddle Type, m.d.
10x24" Landis Self-Contained, m.d.
10x36" Cincinnati Hydraulic, model EA, m.d.
10x48" Brown & Sharpe, belt
10x72" No. 16 Brown & Sharpe, belt
10x72" Landis, m.d.
12x36" Landis, m.d.
12x48" Cincinnati Self-Contained, m.d.
12x48" Modern, belted m.d.
12x96" Landis, m.d.
14x18" Cincinnati Self-Contained, m.d.
14x48" Cincinnati Self-Contained, m.d.
14x52" Norton, motorized
16x48" Landis Type D, m.d., 1942 machine
20x120" Landis Self-Contained, m.d.
24x120" Cincinnati Self-Contained, m.d., Filmatic, 1942 machine
26x96" Landis Self-Contained, m.d.

24x120" Cincinnati Plain Self-Contained Grinding Machine.

INTERNAL GRINDERS

No. 16RS Bryant, m.d., 1942 machine
No. 6, 10, 20 Bryant, belt
No. 16—38 Bryant Hydraulic, m.d., 1942
No. 16-A-16" Bryant, m.d., 1942
No. 16-22 Bryant, m.d., late
No. 24-21 Bryant, m.d.
No. 24-36 Bryant, m.d., 1942 machine
No. 49 Heald Single End Borematic, m.d.
No. 70 Heald, belted m.d.
No. 72A Heald, m.d.
No. 72A5 Heald Sizematic, m.d.
No. 72A5 Heald Plain, long bed type, with extended bed, latest
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 73 Heald Airplane Cylinder, m.d., new
No. 74 Heald, m.d.
No. 172 Heald Gap Grinder, m.d., new, latest type
No. 174 Heald Gap Grinder, m.d., latest type
No. 649-16 Van Norman Internal Automatic Oscillating Radius Grinder, m.d.

RADIAL DRILLS

3'-10" Fosdick Plain, gear box on base
3' American Sensitive, belt
4' American Sensitive, d.c. on arm
4'-13" American Triple Purpose, gear box
4'-12" Fosdick Plain, gear box
4' Niles-Bement-Pond Semi-Universal, m.d.
5'-13" American Triple Geared, gear box

RADIAL DRILLS (Cont.)

5'-15" American Triple Purpose, gear box
5'-13" Cincinnati-Bickford, d.c. m.d.
5' Cincinnati-Bickford Full Universal, gear box
5' Cincinnati-Bickford Plate Hole Driller, m.d.
5' Prentice Plain, m.d.
6'-15" Carlton Plain, gear box
6' extended to 7'-15" col. Cincinnati-Bickford Plain, m.d.
6' Niles-Bement-Pond Semi-Universal, m.d.
6'-16" Western, m.d.
7' Dreses, 17" col., m.d.
8'-16" American Triple Purpose, d.c. m.d. on arm
8'-19" American Triple Purpose, d.c. m.d. on arm, p.r.t., 1942 machine
10'-22" American Triple Purpose, m.d. on arm

UPRIGHT DRILLS

20" Barnes Self-Oiling All Geared, m.d., tapper
21" Cincinnati-Bickford, m.d., tapper
21" Fosdick, gear box, tapper
24" Cincinnati-Bickford, belt, tapper
30" Rich H.D., m.d.
H3 Barnes Hydram, m.d.
D4 Colburn H.D., m.d.
D8 Colburn H.D., s.p.d.
No. 25 Foote-Burt H.D., m.d.
No. 36 HO Baker H.D., m.d., 40" circular table
No. 217 Baker H.D.

GEAR SHAPERS

No. 61A Fellows, m.d., 1942 machines
No. 645A3 Fellows, m.d., 1945 machine
No. 6, 61, 645 Fellows, belt
No. 7, 7A Fellows, m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 615A Fellows, m.d.
No. 64-S Fellows, m.d.

GEAR GRINDING MACHINES

9" Pratt & Whitney Hydraulic Spur Gear Grinder, m.d.
10" Pratt & Whitney Spur & Helical, m.d.
No. 2HS Lees-Bradner Spur & Helical, m.d.
No. 13LS Fellows Gear Lapper, m.d.

MANUFACTURING TYPE LATHES

No. 4 R. K. LeBlond Boring Lathe, 37' bed, 14'4" boring length, 13" hole thru spindle, latest type (2)
No. 9 Heavy LeBlond Multi-Cut Lathe, m.d.
No. 12 LeBlond Multi-Cut Lathe, m.d.
3½x36", 3½x80", 4x60", 8x84" LoSwing, m.d.
8x32" LoSwing, m.d., 1942 machine
9x12" Sundstrand Mfg., s.p.d.
11x18" centers LeBlond H.D. Rapid Production, m.d.
13x24" Coulter Automatic Threading, m.d.
13x24" LeBlond Rapid Production, m.d., Timken, 1945 machine
13x36" LeBlond Rapid Production, m.d., Timken, 1942 machine
13x48" Coulter Automatic Threading, m.d.
15"x6' Automatic Threading, m.d.
16"x6' LeBlond Rapid Production Geared Head, m.d.
17"x6' LeBlond Automobile Mfg., cone
17"x8' LeBlond Rapid Production Geared Head, s.p.d.
17"x8' LeBlond H.D. Automobile Mfg. cone
20"x8' LeBlond Mfg., m.d.
21"x8' LeBlond Turret, cone
Niles-Bement-Pond Quartering Machine, 91" swing, 11'10" centers, new
Schauer Type NA 2B Speed Lathe, m.d.

SHAPERS

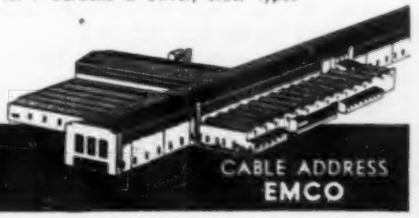
18" Invicta, m.d., new, universal table
24" Gould & Eberhardt Invincible, m.d.
24" Potter & Johnson, cone
32" Morton Draw-Cut, m.d.
36" Morton Draw-Cut, m.d.
48" stroke Morton Special H.D. Draw-Cut Traveling Head Shaper, with d.c. variable voltage electrical equipment, has 7' horizontal travel, cutting speed 15' to 75' per minute

SAWS

6x6" Peerless H.D. Hydraulic Saw, with Hydraulic bar feed
6x6" Peerless Hack Saw, m.d. thru gear box
6x6" Peerless Hack Saw, m.d.
Wagner Cold Saw, 28" blade, m.d.
Wagner Cold Saw, 22" blade, m.d.
DeWalt Model ME 1 Abrasive Cut-Off Mach., m.d.
7½ H.P. Cincinnati Elec. Tool Co. Abrasive Cut-off Machine, type JCAW
No. 3, 8 Nutter & Barnes Cold Saws
No. 6 Cochran-Bly Cold Saw
No. 138 Espen-Lucas Cold Saw, 30" blade

TURRET LATHES AND SCREW MACHINES

No. 1H6 Libby, m.d., chucking, 1942 machine
No. 1 Cin. Acme Semi-Univ., m.d., bar, chucking
No. 1 Cin. Acme Semi-Univ., m.d., chucking
No. 1L Gisholt Universal, m.d., chucking, Timken, hardened ways
No. 1L Gisholt as above, long bed types
No. 1A Warner & Swasey Universal, m.d., chucking, pre-selector, latest
No. 1A Warner & Swasey as above, with air chuck
No. 1A W & S Univ., m.d., chucking, older type
No. 1A Warner & Swasey as above, bar
No. 2B Foster Universal, m.d., chucking
No. 2L Gisholt Universal, m.d., chucking, Timken, hardened ways
No. 2L Gisholt as above, long bed types
No. 2G Morey Ram Type, m.d., bar
No. 2 Pratt & Whitney Shaver, m.d
No. 2A Warner & Swasey Universal, m.d., chucking, Timken, covered ways
No. 2A W & S Univ., m.d., bar, older type
No. 3 Cincinnati Acme Universal, m.d., cross sliding turret, chucking
No. 3 Foster Geared Head, m.d., bar
No. 3B Foster Universal, m.d., bar
No. 3L Gisholt Universal, m.d., chucking
No. 3L Gisholt as above, with cross sliding turret
No. 3 Warner & Swasey Univ., m.d., bar, latest type
No. 3 Warner & Swasey as above, chucking
No. 3A Warner & Swasey Universal, m.d., bar
No. 3A Warner & Swasey, as above, chucking
No. 3A Warner & Swasey Universal, chucking, Timken, covered ways
No. 4R Cincinnati Acme, M.D., bar
No. 4 Gisholt Universal, m.d., chucking, Timken, hardened ways
No. 4 Warner & Swasey Ram Type, cone, motorized, bar and chucking types
No. 4 Warner & Swasey Universal, bar, m.d., pre-selector, latest
No. 4 Warner & Swasey as above, chucking
No. 4 W & S Universal, older types, bar & chucking
No. 4A Warner & Swasey Universal, m.d., chucking, latest type
No. 4A Warner & Swasey Universal, m.d., chucking, older type
No. 5 Bardons & Oliver Universal Ram Type, m.d., chucking, pre-selector, late
No. 5 Foster All Geared Head Universal, m.d., chucking, Timken
No. 5 W & S Universal, m.d., chucking, Timken
No. 7 Bardons & Oliver Universal Ram Type, m.d., chucking, late type
No. 7 Bardons & Oliver, older types



We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

YOUR MONEY GOES *Further* When You Buy *Guaranteed* New, Used or Rebuilt Machine Tools at Botwinik

MILLERS

Van Norman No. 2SU Univ. Miller (very latest type); tble. wkg. surf. 50"x12"; feeds long. 24¼"; cross 10", vert. 17"; 18 spdle spds, 25 to 1250 RPM atchmts.

Kempsmith #2G Univ. Miller (late type 1943) motor in base; tble wkg. surf. 45"x10"; range long. 28", cross 10", vert. 19"; spdle speeds 18, range 18-575 RPM; #50 taper; Univ. dividing heads; vise, arbor.

Cin. #3S Rect Overarm Univ. Milling Machine; motor in base; late type; tble wk. surf. 55⅝"x12"; feed long. 34", cross 12", vert. 20"; spdle speeds 16, range 18-500 RPM.

B. & S. #2 light types, plain miller motor in base (late type); complete with vert. hed; tble wkg. surf. 45"x10"; range long 28"; cross 10", vert. 15"; speed range 40 to 1300 RPM.

B. & S. #3 dble overarm, motor in base, plain miller; tble wkg surf. 55⅝x14"; range long 34", cross 12", vert. 20"; spdle speeds 16, range 21 to 496 RPM.

LATHES

Bridgeford 36"x14' heavy duty eng. lathe, 9 speeds; G.H., AC M.D.; dist. betw. ctrs. 7'; sw. 38½".

Reed Prentice 16"x8', mod. "B" 16 speed G.H. eng. lathe (1942 vintage). Sw. 18½", cent. 54"; Timk. bearing spdle; complete with taper atchmt; threading dial; two chucks; std. equip.

Hendey 14"x6' EBM lathe; MD, taper atchmt, collets.

Lodge & Shipley 20"x8' eng. lathe; 12 spd. grd. hd.; dist. btwn. ctrs. 43"; sw. 23", M.D.

Hendey 24"x18' Yoke Head, MD QCG, Eng. lathe, taper atchmt; sw. 24¾"; dist. btwn. cents. app. 12 feet; cuts threads from 1 to 56 per inch.

SHAPERS

Gould and Eberhardt 16", 20", 24", M.D. Crank Shapers.

Hendey 32" Timken Bearing M.D. Crank Shaper, late type.

Stockbridge 24" M.D. Crank Shaper, V-belt M.D.

PRESSES

Toledo No. 59 str. sided dble. geared, 4 piece steel tie rod construction Press; cap. 240 tons; str. of slide approx. 12"; opening in bed approx. 18"x21"; dist. bed to slide, stroke down, adjustment up 42".

Billings & Spencer #2 Trimming Press; standard str. of arm 4"; str. of cut-off slide 2¾"; dist. btwn uprights 26".

Bliss #73½ Str. Side Trimming Press, With Side Shear; stand. stroke 3"; adj. of slide 3"; opening in bed 10"x10"; width btwn uprites 18"; btwn gibs 14½"; dist. bed to slide, stroke down, adj. up 15".

HAMMERS & UPSETTERS

Chambersburg 4000 lb board drop hammer.

United 2000 lb. board drop hammer

Bradley 300 lb. Upright Helve Hammer

National 7½" Upset Forging Machine.

TURRET LATHES (all late type)

W. & S. #3 Univ. Turret Lathe; late type; sw. 15⅜"; hole thru spdle 1-27/32" complete with bar feed; collets.

Bardons & Oliver #3 Univ. 1½" collet cap.; sw. 15⅜"; hole thru spdle 1⅞"; max. dist. turret face to spdle 24"; spdle speeds (2) 3 HP. Bar feed.

Cin. Acme No. 6W Univ. Turret lathe; hole thru spdle 3"; sw. over ways 20¼"; spdle speeds 9, 30-600 arr. for bar feed.

Jones & Lamson #5 Ram Type Turret Lathe; hole thru spdle 3"; sw. over ways 21¼"; spdle speeds 12, 20-1000. Arr. for bar feed.

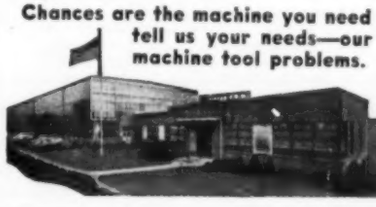
AUTO. SCREW MACHINES

Conomatic 1⅞"—6 spindle, late type.

B. & S. #2G High Speed Full Auto. Screw Machine (latest type); 1½" cap. top slide; large assortment of tools.

National-Acme Gridley 9/16" RA 6-spindle Auto. Screw Machine; very late type; Multi V-belt MD; chip conveyors.

Chances are the machine you need is not listed here. Write, wire or phone—tell us your needs—our engineers will gladly help you solve your machine tool problems.



Botwinik Brothers of Mass., Inc.
3 SHERMAN ST. • WORCESTER 1, MASS.

National Bent Shank Nut Tappers Battery of ⅝" to 1" Machines.

Waterbury-Farrel Fdry. ⅝" and 1" D.S. S.D. Cold Headers, also Thread Rollers.

Fisher 5" Bar, Floor Type Boring Mill. New in 1942.

Niles, Bement, Pond 60"x60"x24' table 4-Head Planer, Rev. D.C. M.D.

Bliss Presses in all sizes up to 1,000 ton capacity.

Wire Working Machinery.

National Machinery Exchange
128-138 Mott St., New York 13, N.Y.

LATHES FOR SALE

BRIDGEFORD 36x24' centers Motor Drive
JONES & LAMSON "Fay" 20x25" Auto. Latest
LODGE & SHIPLEY 18x72" centers MD
LODGE & SHIPLEY #5 Duomatic Latest
LOSWING 8x60" centers Latest Type
NILES 30x50' boring "Timesaver" Timken Latest
NILES 26x48" and 72" centers MD
NILES 30x100" centers Motor Drive
NILES 42x39' centers Motor Drive
NILES 48x87" centers boring and turning MD
NILES 72x59' centers boring and turning MD
PUTNAM 42x25' centers geared MD
SCHUMACHER & BOYE 24x158" centers geared Motor Drive

HARRISON MACHINERY EXCHANGE, INC.
South 4th St. Harrison, N. J.
10 minutes from New York City—5 minutes from Newark, N. J.
Tel.: HUMBOLDT 2-5750, 2-5775

AUTOMATICS

No. 0G Brown & Sharpe
9/16" Acme Gridley Model R6
8" Bullard Multamatic
No. 2F Foster "Fastermatic"
⅞" x 1¼" Cone 4 spindle
1-1/16" Cleveland Model M
1⅜" New Britain Model 61
1⅞" Conomatic 8 spindle
2" x 18" Cleveland Model B
No. 454 New Britain 4 spindle
14" x 18" Monarch Mag-Na-Matic
14" x 19" Fay Automatic lathe
15" x 22½" Sundstrand Auto. stub
6" Sundstrand Auto. stub
1" Economy bolt head shaver

BORING MACHINES

Vernon vertical jig borer
No. 2 Pratt & Whitney vertical jig borer
2½" No. 25T Giddings & Lewis horiz.
3" No. 3A Universal horiz.
3", No. 31 Lucas
3¾" No. 32 Lucas horiz.
4" Model 42 Lucas precision horiz.
4½" No. 33 Lucas horiz.
7" Barrett cylinder borer
24" Bullard vertical turret lathe
42" Bullard vertical turret lathe
52" King
100 Niles-Bement-Pond vertical
No. 42 Heald Bore-Matic
No. 47A & 48A Heald Bore-Matic
No. 4HH Baker 2 way drill
Munson double end borer

DRILLS, MULTIPLE

6 or 8 spindle No. 11 Natco
12 spindle No. 39 Natco, rail type
12 spdl. No. 25 Baush hydr. rail
22 spindle No. 14 Natco
24 spindle No. 2 Baush
34 spindle No. 30 Natco
42 spindle No. B16 Natco
No. B4A Natco multiple or Hole tapper
Baush horizontal 2 way multiple

GRINDERS, INTERNAL

No. 72A5 Heald hydraulic with cross sliding head
No. 72A5 Heald plain with extended bridge
No. 72A3 Heald plain with cross sliding head
No. 72A3 plain with facing attmt.
No. 72A3 Heald Sizematic centerless
No. 72 Heald Sizematic internal
No. 75A Heald internal, cross feeding headstock
No. 75 Heald internal
Size IG Grenby internal gdr.
Majestic internal grinder
No. 42 Van Norman grinder
No. 16 A16 Bryant, internal and facing
No. 16 CP16 Bryant
No. 16-28 Bryant
No. 16-38 Bryant
No. 24-36 Bryant
MH1 Sav-way hydraulic feed internal

LATHES

14" x 6' Mulliner
14" x 6' Lodge & Shipley
14" x 8' American
15" x 6' Porter McLeod
16" x 30" centers Monarch
18" x 8' Rockford
36" x 16' Bridgeford

SHAPERS

6" Pratt & Whitney vertical
16" Gemco
16", 24" & 28" Gould & Eberhardt
20" & 24" Gemco universal, New.
24" Columbia universal

UPSETTERS

4" Ajax twin geared
2" Acme
700 ton No. 7C Ajax forging press

MILES MACHINERY CO.
SAGINAW, MICH.

LATEST TYPE NEARLY NEW MACHINES

AUTOMATIC SCREW MACHINES

BROWN & SHARPE #4 2" capacity, Latest Type
BROWN & SHARPE #2G High Speed, Latest Type
CONOMATIC 2⅝", 6 spindle, Latest Type
GOSS & DeLEEUW 8" Automatic Chucker, 5 spindles

BORING MILLS—Horizontal

CINCINNATI-GILBERT 3½" Bar, Floor Type, Latest
DETRICK & HARVEY 4" bar, Floor Type
GIDDINGS & LEWIS #25, 2½" Bar, M.D.
HEALD 48A, 49 Single End Bore-Matics, Latest
LANDIS #35, 3⅛" Bar, Floor Type, M.D.
LUCAS #41, 3" bar, table type, latest
NILES-BEMENT-POND 5", 6", bar, floor type, M.D.
UNIVERSAL 3" Bar, Table Type, High Speed, Latest

BORING MILLS—Vertical

BETTS 120" 2 swivel heads, AC, M.D.
BULLARD 36" Vertical Turret, Side Head, PRT, M.D.
BULLARD 61" Maxi-Mill, 2 heads, Motor Drive
BULLARD 16" 6 spindle, 8 spindle, Mult-au-matic, Type D Single Indexing, Latest Type
BULLARD 36" Vertical Turret "Spiral Drive" Latest
COLBURN 72" AC, M.D., 2 swivel heads, PRT
KING 62" 2 swivel heads, PRT, M.D.
NILES 38-44 Vert. Turret Side Head, PRT, M.D.
NILES 100" 2 Swivel Heads, PRT, M.D.

BARNES No. 307 Vertical Honing Machine; hydraulic; self-oiling; capacity 6½" diameter; stroke 25"; LATEST TYPE

BROACHES

CINCINNATI 1-30 Duplex Vert. Hyd., Latest
CINCINNATI 3-30 Duplex Vert. Hyd., Latest

GEAR CUTTING EQUIPMENT

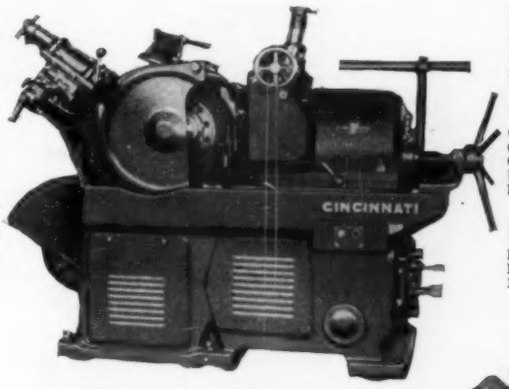
FELLOWS Model Z Gear Shaper, High Speed, Latest
FELLOWS 6I, 7, 7A, 72, 75, 77, 61A High Speed Gear Shapers, latest type
FELLOWS Type 6Z2 Gear Shaper, High Speed, Latest
FELLOWS #13 LS Lapping, Latest Type
GLEASON 3", 12" Straight Bevel Generator, latest
GOULD & EBERHARDT 12H, 12HS Hobber, Latest
GOULD & EBERHARDT #36H Hobber, M.D.
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, Universal, Latest
BROWN & SHARPE #5 Plain, 3x12, Latest Type
BROWN & SHARPE #20, 10x18 plain, latest type
CINCINNATI 6x18 plain Model EA, hyd., latest
CINCINNATI 16"x36", Plain, "Filmatic", Latest
LANDIS 4"x12", 4"x18" Type H, Plain, Hyd., Latest
NORTON 6"x18", Type C, Plain, Hyd., Latest
NORTON 10x72 centers Plain Type C Mech., Latest
NORTON 14x36" centers Plain Type C Hyd., Latest

GRINDERS—Misc.

BRYANT #5, #16-16, #16-CP-16, #24, Internal Hydraulic, Latest Type
CINCINNATI #3 Centerless, Motor Drive
CINCINNATI Centerless Lapper, Model ED, Latest
CINCINNATI "Monoset" Tool & Cutter, Latest
COVEL #22 Universal Tool & Cutter, Latest Type
FITCHBURG 14"x25" Spline, Hydraulic, Latest
HEALD, 75A, 72A3, 72A5, 74, 70A Internal, Latest
HEALD #72A3, 72A5 Internal "Gagematic", Latest
JONES & LAMSON 6x15, 8x18, Auto. Thread, Latest
PRATT & WHITNEY Contour, Latest
THOMPSON 6"x48" Auto., Round Broach, M.D.



CINCINNATI #2 Centerless Grinding Machine; model EA "FILMATIC"; LATEST TYPE

GRINDERS—Surface

BLANCHARD #11—16 chuck, Latest Type
BLANCHARD #16—24" chuck, Motor Drive
DO-ALL Model G-7, 9"x20", Hyd., Latest Type
GALLMEYER & LIVINGSTON #35, 8"x24", Latest
HEALD #22, 12" chuck, Rotary, latest type
HEALD 25A, 16" or 30" Chuck, Rotary, Hyd., Latest
NORTON 6"x18"—Hyd.—Latest Type
THOMPSON 12x12x24 Type B Hyd., Latest
THOMPSON 12x12x40 Type B Hyd., Latest

LATHES—Engine and Mfg.

AMERICAN 36"x360" centers, 2 carriages, M.D.
BRIDGEFORD 36"x24' centers, 2 carriages, M.D.
JONES & LAMSON "FAY" 20"x25" Automatic, Latest
LEHMAN 16x30 hydratrol, Timken, latest type
LODGE & SHIPLEY 18"x72" centers, M.D.
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers, latest
MONARCH 22x456" centers Model CM, 3 car, Timken, Latest Type
MONARCH 12x54" centers Timken, Latest Type
MONARCH 10"x20" centers, Model EE Timken, Latest
MONARCH 24"x54" centers, geared, Motor Drive
NILES 42"x60", double head, M.D.
NILES 90x110 centers Standard Driving Wheel, M.D.
NILES 48x87' centers, Boring and Turning, M.D.
NILES 72"x62', centers, Boring and Turning, M.D.
NILES 30x50' Boring, Timken, Latest Type
PRATT & WHITNEY 16x30" centers, Timken, Latest
PRATT & WHITNEY 10x20" centers, Bench, Latest
PRATT & WHITNEY 16"x60' centers, geared, M.D.
PUTNAM 42"x25' centers, geared, Motor Drive
REED PRENTICE 16x24" centers, geared hd., M.D.
REED PRENTICE 16x48" centers, Geared Head, m.d.
SCHUMACHER & BOYE 24"x158" centers, geared, M.D.
SPRINGFIELD 14x42" centers Geared Head, M.D.
SPRINGFIELD 16"x30" centers, Timken, Latest Type
WARD HAGGAS & SMITH 18/36"x10' bed, Gap

LATHES—Turret

BARDONS & OLIVER #5, #7 Timken, latest
CINCINNATI ACME No. 1, Latest Type
FOSTER 4FU, Fastermatic, Timken, Latest
GISHOLT #3, 4, Univ., Timken, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest Type
JONES & LAMSON #3, #5, Univ., Latest
MOREY No. 2G, No. 3, No. 4 Timken, Latest
POTTER & JOHNSTON 5D, 5D2E, Timken, latest
WARNER & SWASEY 2A, Univ., Bar & Chuck, with or without "PRE-SELECTOR", Latest
WARNER & SWASEY #5, Univ., Timken Bearing
WARNER & SWASEY #1A, Univ., Latest Type

MILLING MACHINES—Mfg.

CINCINNATI 24" Duplex, Timken, Motor Drive
HALL Style D, Planetary, Latest Type
INGERSOLL 42x38x12' Planer type, Adjustable rail, 4 heads, AC, M.D.
INGERSOLL 32x30x12' Planer Type Slab, AC, M.D.
INGERSOLL 32x24x16' Planer Type 2 heads, AC, M.D.
SUNDSTRAND Model 3A, Duplex Timken, Latest Type
TAYLOR & FENN M-80 Duplex, Spline, Latest Type

MILLING MACHINES—Plain

BRIGGS Type A Hyd., 12" and 18" feed, Latest Type
BROWN & SHARPE #12, 24" feed, Timken, Latest
BROWN & SHARPE 3B, Timken, Latest
BROWN & SHARPE No. 2 Light Type, Timken, Latest
CINCINNATI #4 Timken Bearing, M.D.
CINCINNATI #3, 4, 5 Motor Drive
CINCINNATI 4-36 Hydromatic, latest type
CINCINNATI 0-8 Auto. rise and fall, Timken, Latest
KEARNEY & TRECKER #3, 4 heavy, Timken, Latest
KEARNEY & TRECKER 1218 simplex, latest
KEMPSMITH #4 Maxi-Mill, Timken, latest

MILLING MACHINES—Vertical

CINCINNATI 0-8 Timken Bearing, Latest Type
CINCINNATI #2, 3, 4, Dial Type, Timken, latest type
GORTON 9J Super Speed, Latest Type
KEARNEY & TRECKER #3H Timken, Latest
REED PRENTICE 3VG with or without Hydraulic Duplicator, Timken Bearing, latest type

MILLING MACHINES—Thread

HANSON & WHITNEY 4"x9" centers, Latest Type
PRATT & WHITNEY 6x60" Type C, Latest Type
MOREY 12x30, 12x60, Latest Type

LEES BRADNER 12"x24" centers, Model HT Thread Miller, 6" hole through spindle, LATEST TYPE

MILLING MACHINES—Universal

BROWN & SHARPE #4A; M.D.
CINCINNATI No. 3, dial type, High Speed, Latest
CINCINNATI #4, High Power, Motor Drive
KEARNEY & TRECKER #2 Heavy, Timken, M.D.
KEMPSMITH #4 Maxi-miller, Timken, Latest
VAN NORMAN #12, #36 Timken, Latest Type
VAN NORMAN #3, Duplex, M.D.

PLANERS

DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
GRAY 36x36x8', 2 heads, maximum duty, DC, M.D.
NILES 54x54x18', 4 Heads, Box Table, DC, M.D.
NILES 48"x48"x16', 2 heads, AC M.D.
NILES 48"x48"x16', 3 heads, Box Table, AC, M.D.
SELLERS 30" Plate Edge, Motor Drive

PRESSES

BIRDSBORO 325 ton, vert. hyd., Latest Type
CHAMERSBURG 50 ton vert. hydro-pneumatic
CLEARING Type DS 1125-32 dbl., action 125 ton, Latest Type
CLEARING Type H-50-36-35 ton Vert. Hyd., Latest
FERRACUTE #DG-55, 75 ton drawing, Latest Type
HPM 37-ton Vertical Hydraulic, Latest
NILES 600 Ton Horiz. Wheel Press, M.D.
UNITED ENG. 2,000-ton Hyd. Steam

MISCELLANEOUS

AJAX 1½", 3½", Bolt Heading, Upsetting and Forging
BARNES #172, 306H, 307 Vertical Hone, Latest Type
CAMPBELL #401 Abrasive Saw, Latest Type
CLEVELAND 12"x16" Cutter Reliever, Motor Drive
GROB #08-20 Band Saw & Filer, Latest
MICHIGAN #1708A Cutter Reliever, Latest Type
PELLOW #2 Nut Slotter, Latest Type
PRATT & WHITNEY "Keller" Type G, Type BL2416
PRATT & WHITNEY ½Bx30, 2 spindle, Latest
PRATT & WHITNEY ½Bx50 2 spindle Rifler, Latest
QUICKWORK ¾", 1" Capacity Rotary Shear, M.D.

Available for Prompt Shipment ***Most Built After 1941***

(Partial List) Over 2,000 Machine Tools in Stock. Your Inquiries Are Invited . . . Prompt Service Is Assured

MOREY MACHINERY CO., INC.
406 BROOME ST., NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-5360
CABLE ADDRESS: WOODWORK, N. Y.

SEARCHLIGHT SECTION

Late Type — EVERY MACHINE TESTED AND GUARANTEED AS REPRESENTED — *Immediate Delivery*

LATHES

SOUTH BEND, 10"x31½', 14½"x6', 16"x8'
BRADFORD, 16"x6'.
CLAUSING, 12"x5' M.D.
HENDEY, 16"x6', taper attach.
RIVETT, No. 608 taper attach. precision
LE BLOND 'REGAL', 13"x4'
ELGIN & HARDINGE PRECISION, 1" cap.
PRATT & WHITNEY, 10"x20", precision
PRATT & WHITNEY, 13"x6', taper attach.
SIDNEY, 18"x10', taper attach.
Monarch Toolroom 16"x30" Model "C"
Monarch Toolroom 18"x54" Model "C"
SEBASTIAN 12"x6' GH M.D.
AMERICAN 18"x8' M.D.
SPRINGFIELD 16"x6"; Motor in Base, 12 speeds
MONARCH 14"x8' GH TA.
AMERICAN 26"x13' GH. QC. TA.
AMERICAN Pacemaker 16"x54" latest

TURRET LATHES

WARNER & SWASEY #5 Universal, Preselector
GISHOLT, #3 bar equip. preselector, #5, #1L
WARNER & SWASEY, #1A chucking
FOSTER, #5 universal, bar feed
SIMMONS MICRO-SPEED, 1¼" cap. bar feed
WARNER & SWASEY #1, ⅝" cap. hand.
BROWN & SHARPE, #0 and #1 Hand Screw
BARDONS & OLIVER #5 Preselector 2" cap.

GRINDERS

BROWN & SHARPE #2 Universal
NORTON #2 Universal Hydraulic Tool & Cutter
COVEL, #91A, tool & cutter universal
LANDIS, cylindrical, type H, 4"x12"
HEALD #72A3, plain internal, HYD.
BLANCHARD, VERTICAL SURFACE, #16, 26"
BLANCHARD, VERTICAL SURFACE, #11, 16"
ABRASIVE, VERTICAL SURFACE, #33, 8x24"
BROWN & SHARPE, #5 surface, hyd.
REID, SURFACE, 2B Pope spindle
RIVETT #104—Int.—Ext. Latest
BROWN & SHARPE #2 & #2B Surface
Excello Thread Grinder #31
GALLMEYER & LIVINGSTON 12x24 Hydraulic
Jones & Lamson Thread Grinder, 12"x45"
Do-All Hyd. Surface Grinder 6"x18"
Cincinnati Universal Grinder 12"x36", ext.-int.
Wicaco Precision Internal
Cincinnati cylindrical 12x72" centers

SHAPERS

Cincinnati 24" latest heavy duty
Gould & Eberhardt, 16", 20" Industrial
Stockbridge, 16", M.D.
Pratt & Whitney, Vertical 6", M.D.
Atlas on steel bench 7" M.D.
Shaperite floor model 8" NEW

DRILL PRESSES

American 3' Sensitive Radial
American Radial, 4'x11" column
Avey, #2 single spindle, 15" overhang
Leland-Gifford, #2, single spindle
Allen, 6 spindle, #2, 12" overhang
Natco, multi-spindle, #D5
Canady-Otto, 17" Roller bearing
Buffalo #22 BG. PF. #4 MT.
Cleerman drill box col. #4 MT.

PLAIN MILLERS UNIVERSAL

BROWN & SHARPE, #3A, UNIVERSAL
BROWN & SHARPE, #3B, PLAIN
BROWN & SHARPE, #3, UNIVERSAL
CINCINNATI, #2MH, Universal
KEARNEY & TRECKER, #1B, S.P.
BROWN & SHARPE #2 Light Type, Vertical Head
ROWBOTTOM Cam Miller
VAN NORMAN #1½ and #12 Duplex Ram type
VERNON Miller, motor in base
CINCINNATI #3 plain M.D.
HENDEY universal #2B Vert. attach.
PRATT & WHITNEY #12B Profiler 2 sp.

VERTICAL MILLERS

CINCINNATI, #3, #4, dial type
VAN NORMAN, #3V, rapid traverse
KEARNEY & TRECKER, #3KM, dial type
KEARNEY & TRECKER, #3H, dial type
PRATT & WHITNEY jig borers #2

Pels Combination punch & shear #16 with notcher, M.D.

PRODUCTION MILLERS

WALTHAM thread miller, ext. & int.
CINCINNATI, #1-12 automatic
KEARNEY & TRECKER, #1H-18 Mfg. type
BROWN & SHARPE #000, high speed

GEAR MACHINERY

FELLOWS #61A, Model—712
GLEASON, 18" and 24" cap. Bevel Gear Cutters
GOULD & EBERHARDT, #735, spur gears

AUTOMATIC SCREW MACHINES

BROWN & SHARPE, #0G, ⅝" cap.
BROWN & SHARPE, #2, high speed
BROWN & SHARPE, #2, with slotter
BROWN & SHARPE, #00, high speed ⅜" cap.
ACME GRIDLEY 2" cap. RA6

BOREMATICS AND BORING MILLS

Defiance #25A Horizontal 3¾" Bar
Lucas No. 41, 3" cap. extra long table

PRESSES, SHEARS, BRAKES

Niagara 6'x10 gage, 16" gap
Famco Shears, 36", 52" NEW
Ferracute Press #C3, inclinable
Lake Erie hydraulic 750 ton like new
Diebel Hi-speed and roll feed
Hydraulic Press 25 ton to 750 ton
Bliss Incl. #20 roller pin clutch
Ruesch #2 percussion press. 60 ton.
Watson Stillman 200 ton hobbing press with duplex pump.

MISCELLANEOUS

Doall continuous bandfiler Model BF
Riveting Hammers, high speed, #5A
Spot Welders 5 KVA to 100 KVA
Famco Foot Presses, #6, #8, #10, #12, #15
BUTTERFLY Filing machines
Porter Cable belt sanders

THIS IS A PARTIAL LISTING—TREMENDOUS STOCK ON HAND—YOUR INQUIRIES WILL RECEIVE OUR PROMPT AND COURTEOUS ATTENTION

CAPITOL MACHINERY CORPORATION

253 CENTRE STREET — **NEW YORK 13, N. Y.**

MONA MEMBER

AUTOMATICS

#0G B & S, late type
1⅛" & 1⅝" S Spdl. Cone, late
9/16", 1", 1¼", 1⅝", 2", 2¼"
2⅝" Acme Gridleys, late
2¼" & 2⅝" Cone S Spdl., late
12" and 16" S Spdl. Bullard Multaumatics, late type with tooling

PRESSES

2800 ton Bliss Hydr., 3 col. type, 12" str., 30½" sht. ht., dia. bed 115"
60 ton Dbl. Crank, 5" stroke, 48x24 bed, late model Waterbury Farrel
90 ton Dbl. Crank, 8" stroke, 48x18 bed, late model Bliss
35 ton 4, 5, 6" stroke, latest type, w/all accessories, Bliss $850.00 ea.
70-85 ton 4" stroke 21 x 27 bed, 110 strokes per min., Bliss, latest type
90-125 ton 4½" or 5" stroke, 60, 80, 110 (optional) strokes per min., late type
Inclinable, New, 20 to 70 ton, immediate delivery

TURRET LATHES

#4 & #5 Warner & Swasey, late type, lots of tooling
#4FU Fastermatic, 4" cap., late type
#3H8 Libby Sliding Bed Gap, 8¼" cap., late type

PAUL'S MACHINERY COMPANY

MONA MEMBER

6111 Vermont Avenue
Detroit 8, Michigan
TYLER 7-6300

BENNETT SPECIALS

36" Bullard Mill, Spiral Dr., 4 Jaw
4" bar Universal Table Type Mill, 60" spin. to table, 96" spin. to outer support, '42.
3½" & 4" Landis Floor Type Mills
3" bar Yoder, Table Type Hor. Mill, 30" spin. to tble., 72" spin. to outer support, 1942.
48"x20' centers N.B.P. Lathe, Grd. Hd.
42"x96" cen. Amer. Lathe, Grd. Hd., M.D.
48"x⅛" Roller Leveller, 11—4" rolls
36"x32" bed Niles Lathe, 2 carr., T.A.
16"/18½"x54" cc Springfield, TA, '44
7' Carlton 17" col. Radial, 1943
Nos. 5, 4, 3 & 2 W. & S. Turrets, Late
No. 4 Gisholt Univ. Turret Lathe, 1942
2⅝" Acme Gridley RA8 Automatic, 8 spin.
1⅝" Conomatic, 8 spin. (4)
Model 65 New Britain-Gridley 6 Spin., work Rotating Type, New 1943
#9DT Potter Johnson Automatics (2)
#4H—12" Libby Slid. Bed Gap (5)
36"x36"x12' Cinci. Hypro Planer, 4 hds., Var. Voltage, 1943
24"x24"x16' Ingersoll Planer Type Miller, 4 hds., 20 H.P. AC, M.D.
48" N.B.P. Slotter, Grd., Late
15'x¾" Wicks, Bending Rolls, M.D.

BENNETT MACHINERY CO.
30 Church St., New York 7, N. Y.

PRESSES

No. 8 Bliss Triple Crank Press, 255 ton, Bed 42" FB x 108" RL Friction Clutch, Double BG, Twin Drive, M.D.

No. 8 Bliss Double Crank Press, 255 ton, Bed 42" FB x 52" RL, Friction Clutch, Double BG, 26" Shutheight, 12" Stroke, Twin Drive

No. 6 Bliss Double Crank Press, 125 ton, Bed 34" FB x 66" RL, Friction Clutch, Double BG, 26" Shutheight, 12" Stroke, Twin Drive

No. 3 Bliss Double Crank Press, 35 ton, Bed 26" FB x 36" RL, M.D.

No. 1-B Super Speed High Speed Press, 10 ton, Double Roll Feed, 1000 SPM, Motor drive with Reeves Unit

HOWARTH MACHINERY CO.

505 E. 9 Mile Road, Detroit 20, Mich.
Phone JOrdan 4-6490

Nos. 1A & 2A W & S Turret Lathes.
Barber-Colman Model S Hob Sharpener.
48" x 1/16" Torrington Slitter.
No. 2G B & S Automatic.

D. E. DONY MACHINERY CO.
47 Laureiton Road, Rochester 9, N. Y.

Bor. Mill, Hor. 3" G and L. MD.
Boring Mills, 24"-30"-42"-52"-72"-90"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 3-A W and S, S.P.D.
Millers, Plain No. 3 K and T, No. 4 Cin.
Millers, Vertical No. 3 B and S and No. 4 Cin.
Shaper, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.
Squaring Shear, Niagara 11'x10 gauge

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

CRANES—FOR SALE—BARGAINS!

MILWAUKEE 5 ton; 25' span; 230 volts DC
MILWAUKEE 5 ton; 37'2" span; 230 volts DC
MILWAUKEE 10-ton; 36' span; 230 volts DC
MILWAUKEE 25-ton; 34'4" span; 230 volts DC

HARRISON MACHINERY EXCHANGE INC.
SOUTH 4th ST., HARRISON, N. J.
TEL.: HUMBOLDT 2-5750, 2-5775

SCARCE LATE MODELS

Consomatic 1¾" 8 spindle
TANNEWITZ BAND SAW #36M
3" UNIVERSAL HORIZONTAL BORING MILL
CHICAGO (D&K) #335 PRESS BRAKE, WITH DIES
DELTA SINGLE & MULTIPLE DRILL
Walker Turner Bench Drills ½"
Excelsior 21", Buffalo 18" Drills
GORTON DUPLICATORS 9J
GORTON ENGRAVERS 3U, 3L, 3Z, ME, CUTTER GRINDERS
BROWN & SHARPE #2B SURFACE GRINDER
Norton, Thompson 6"x18" Surf. Grind., Hydraulic Feed
G&L #18, 25, 35 Hyd. Surface Grinders
Abrasive #1½, 3B, 34 Surface Grinders
Heald #23A Rotary Surface Grinder
Gorton Cutter Grinders
Atlantic 6"x18 Surface Grinder
CINCINATI 12x36" UNIV. GRINDER, HYDRAULIC, FILMATIC
#2 CINN. CENTERLESS, FILMATIC
Covel #91A Tool & Cutter Grinder
P&W Radius Grinders 12"x36" Surface
Hammond & Excello Carbide Grinders
Gardner #226 Disc Grinder
Black Diamond Drill Grinder
LANDIS #6 THREAD GRINDER
Ball & Jewel Plastic Grinders
NILES BEMENT POND 2500 lb. Steam Hammer
Davis #4 Keyseater, #2 Baker
Hi Speed Hammers all sizes
BOYE & EMMES 20"x30' G.H. LATHE
Monarch 10x20" Lathe Model EE
Hendey 12x30" G.H. Lathes
Lodge & Shipley 16"x78", 12 speed
S. Bend 9x3½", 10x48"
Sebastian 12"x4' G.H. Lathe
LeBlond Regal 15" x 30, 10" x 3½', 21"x60"
Sheldon TRB-56" Lathe
Hardinge, Rivett Precision Lathe
Cinn. & Schauer Speed Lathes
WARNER & SWASEY #3, 4 PRE-SELECTOR TURRET LATHES
Gisholt #4, 5 Univ. Turrets, Tooling
Morey #3 Turret Lathe
Acme #6W M.D. Foster 3B
Oster 601 Rapiduction Turret
Hardinge ESM 2nd operation
Brown & Sharpe #1, 2F Hand Screw
GORTON VERTICAL MILL 8D, 9J, POWER FEED & PLAIN
Cleveland #1 Vertical
Nichols Hand Mill Vert. Head
Van Norman Prod. Mill. Sunstrand
Burke #4 Mills Pl. & Univ.
Cinn. 1-12, 2-18 Prod. Mills
Brown & Sharpe #12 Electric, #000 Production Millers
Van Norman #12, 26, 36 Duplex Head
Cinn. #3 Plain, #4 Vert. Dial Type
Cleveland #1 Vert. Miller
Kent Owens IV Prod. Mills, U.S. Mills
Reed Prentice #10D6 60Z, INJ. MOULDER
MARVEL AUTO. HACKSAW #6A
BLISS PRESS #58 OB Gap, 62, 62A, 162
Stokes Tablet Presses
V&O #102 Reducing Presses
Toledo 400 Ton Knuckle Joint Press
Diamond #31, 30 ton OBI Press
Bliss #4, 5½, Styles Presses
Federal #5 OBI Press, Bliss 21
V&O, Z&H, OBI 25, 35 ton
Ferracute DDG 56 105 ton Double action cam press
CANEDY OTTO 3'x9" COL. RADIAL
Oliver Heavy Die Filer, 510 Drill Pointer, Sellers 4G Drill Grinder
Onsrud Router #W240
Micromatic Hydrohoner H-1
Waterbury Farrel #30 Thread Roller & Dies 1943
Porter Cable G8 Belt Sander
Bakewell #1, Ultromat Tappers
Haskins 3C Tapper
Taylor Winfield 50 KVA Spot Welders
Thompson & Sciaky Seam & Spot Welders
Rafter Mod. 26 Tube Roller
Oliver 20" Woodworking Planer
Peerless #226, Eyeletting Mach.
Clark Hardness Tester
Gen. Flexible Elec. Screw Press
P & W Electrolimit Gage
Lenox ⅜" Throatless shear

AARON
VALUES IN MODERN TOOLS

NORTON ROLL GRINDER 50"x28' Centers. Motor Driven, actual swing 54". Bed divisible into two sections. *IMMEDIATE DELIVERY.*

NEW IN STOCK

Power, Foot & Gap Shears—30" to 96"
8' 10 Ga., 6' 10 Ga., 6' 14 Ga.
Spot & Arc Welders, 6x6" Racine Hacksaw
4, 5, 7, 10, 12, 18, & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8", Shapers
H.S. Vertical Milling Heads
Drill Presses, Foot Presses, Air Hydraulics
Kalamazoo Metal Band Saws
No. 1½ Abrasive Wet Surface Grinder
20 ton Northern Hydraulic Presses
10Z & 20Z Injection Moulders
Famco GC Arbor Presses—½ Price—Presses
Sheldon 12" B.G. Shaper

AUTOMATICS

Cone 4 spindle, Gridley
Brown & Sharpe #4, 6 Auto., #2 Hand Screw

BORING MILLS

#0 Giddings & Lewis scr. M.D. 3"
2½" Cleveland scr. M.D., 2½", 4" Binsee
Niles-Bement-Pond 4- duplex, 60" Niles
Bullard New Era 24", 42", King 42"

GRINDERS

Surface Grinders, 6x18, 8x24, Abrasive, G. & L.
P. & W. 14", B.B., Vert. Surface 19"x49"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", MD. Cyl.
Heald No. 72A3 Gagematic
Norton 50"x28' M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D. Cyl.
No. 55, 60, 65 Heald Int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11, Cyl.: 1, 3 Univ.

LATHES

14"x6' Hendey Taper, Collets 16"x8'
9" LeBlond, P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
Wade, Hjorth, Hardinge, P & W Precision Bench

MILLING MACHINES

3B K. & T. Dbl. Overarm
Cleveland Vert. No. 1 M.D.: #1 Univ.
#2B K. & T. Univ.: No. 2, 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos 1½, 2, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert., S.P.D.

HYDRAULIC EQUIPMENT

500 TON LAKE ERIE PRESS
Platen 35"x36", 36" stroke, 68" opening, 150 H.P., 220-440 V. Motor.
600 Ton Baldwin South. Platens 76"x59, Stroke 22", Opening 36".
500 Ton H.P.M. Double Action with 166 ton cushion. Platen 36"x36", Stroke 24", Opening 36".
1000 Ton French-Oil Bed 53x42", stroke 20" daylight 56".
Brand New 300 ton Watson-Stillman Hobbing Press & Pump.
375 Ton ELMES Double Action, with 60 ton cushion. Platen 84"x44", 12" Stroke, 42" Opening.

350 TON VERSON PRESS
40x40 Platen, 36" stroke, 72" opening. 100 H.P. 3 phase—60 cycle 440 volt.

400 & 500 TON SHAFT STRAIGHTENERS, Self Contained

All Hydraulic equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your hydraulic problems.

P. & W. No. 12, 1 & 2 spind. Profiler
B & S. No. 1, 3 Vert., Kempsmith No. 1, 2
Taylor-Fenn Spline Miller

RADIALS

Carlton 8' Arm 19" col. M.D., 3½' Mueller
4', 5', 6' American Triple Purpose
Walker-Turner ½" cap., Cinn. Bick. 6'

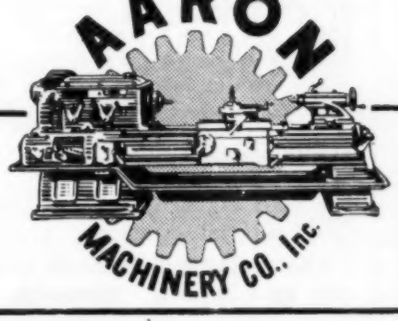
TURRET LATHES

Foster Nos. 4, 5, 6, 1B, 3B, M.D. Univ.
J. & L. 2"x24", 3"x36", W & S #4, 2A

MISCELLANEOUS

Buffalo 25UD Comb. Punch-Shear
Pexto 3' to 8' Shears & Brakes
Gorton 1A; 375-2 Tool & Cutte. Grinders
Wiedman Turret Punch—Type R4P
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
Deckel G1, G2, G1F Engraving machine
Leland-Gifford 1, 2 & 4 spindles, Model MS
Geo Ohl 6' 16 Gage M.D. Shear, 12' 10 Ga. Brake
Oster No. 316B 6" Pipe Threader, M.D.
Bliss 30" Gang Slitter, 19, 20, 21 OBI Presses
Double End Buffers, 1HP, 5HP
K.R.W., Lemco Hydr. Arbor Presses
McCabe Pneumatic Flanger

WRITE FOR OUR FREE ILLUSTRATED CATALOG



AARON MACHINERY CO., Inc.

45 Crosby Street
WOrth 4-8233

New York 12, N. Y.
Cable: AARMACH, N. Y.

MONA

SEARCHLIGHT SECTION

ROLLS—BENDING—Hilles & Jones, 30'x¾" Pyramid, Top Roll 30", Bottom Rolls 18", Motors 75 & 45 HP, 3/60/220-440 controls. New shipyard type—will convert to drop end. Fast delivery. Wt. 120 Ton.

ROLLS—BENDING—Cleveland #2A, 10'x½", Pyramid Type, Drop End, 20 H.P.

IRONWORKER—Combination Punch & Shear, Schaatz, Angles 3½"x3½"x½", Rounds & Squares 1¼"; Punch ¾" thru ½": Motor 3 H.P., Ser. #1783.

IRONWORKER—Combination Punch & Shear, Oeking, Angles 6"x4"x½". Rounds 1⅝", Sqs. 1⅜", Motor, Machine Ser. #516F.

PLANER—Niles Bement Pond, Working Bed 48"x48"x26' with 4 Heads, 15 H.P., D.C. 230 volt, variable speeds.

PLANER—Cleveland, Openside, 36"x36"x12' Working Table, 2 Heads on rail, 1 side head, motor, controls.

GEAR TESTER—Gleason Model #20 (1943) Cap. testing gears—up to 24" diam. like new.

ROTARY GRINDER—Blanchard Cap. 25", Magnetic Chuck, belt drive, old machine, good condition, Bargain.....$750.00

SQ. SHEAR—10'x¾" cap., with 15" Gap, 15 H.P., Wt. 20 Ton.

PLATE PLANER—Hilles & Jones, 30'x2" cap., Pneumatic Hold-downs, 2 Heads, 5" diameter lead screw, 30 HP, 3/60/220 motor worm drive.

PRESS—LAKE ERIE—750 Ton, Hydraulic, Double Action, Bed 81½"x146", will draw & lift out 22½", Complete pump & motors 40 HP & 10 HP controls (1942) Wt. 75 Ton.

WIRE STRANDERS—(1943) Two-Robinson, 6"x7 spool, reel, mtr. 7½ HP.

LATHE—ENGINE—Bridgeford, Geared Head, Q.C., 32"x21' centers, Motor 35 HP, Serial #32,870.

LATHE—ENGINE—Bamford Chase, Latest type, Timken bearing, 14"x6' overall, actual 15½"x36" centers, taper attach., Mtr. in base, #4369.

LATHE—TOOL ROOM—South Bend, Latest type, 14"x6' overall, actual 16"x36" centers, taper attach., draw bar & collets, mtr. in base #134077.

MILLER—Plain Horiz. Model #4K, K. & T., like new, latest dial type double overarm, Table 16"x86", power rapid traverse all directions, motor in base, wt. 14,000 lbs.

HAMMER—Drop Forge, Chambersburg 35,000 lb. cap., like new, air or steam operated, height 24', Weight 525 Ton.

UPSETTER—Horiz. Forging, Ajax #2½", Mtr., 15 H.P., Wt. 15 T. approx.

POWER PRESSES

PRESSES	TONS	STROKE	BED—FB, LR	TYPE
(2) Bliss #58	22	5"	12½"x 13½"	C Frame (1943)
(4) Ferracute C22	22	5½"	13½"x 14"	Duplex, 2 Presses on 1 stand (1943), Hopper Feed
(3) L. & J. #3	22	2½"	12½"x 21½"	O.B.I. (1945) Air Safety
(7) Diamond #30 (New)	31	3"	13" x 22"	O.B.I., Motor
(1) Torrington	50	2" & 1"	23" x 16"	Sub Arch, Dbl Action, Cam
(1) Toledo #54	60	3"	18" x 18"	SS with side shear
(2) Bliss #305	100	12"	24" x 24"	SS, b.g. (1942)
(2) Bliss #6	125	2" & 5"	24" x 32"	SS, dble. or single action b.g. (1942)
(1) Bliss #407	180	27" & 17"	45" x 54"	Toggle, will draw 12½"
(1) Clearing F1200-42	200	30"	38" x 44"	SS, Single Action, (1942) b.g.
(1) Bliss #7-72	200	10"	39" x 74"	SS, Dble. Crank, S.A. Cushion
(1) Baldwin-Southwalk	250+	40"	60" x144"	Hydr., SS—4 Post
(3) Bliss #78½ (310)	450	18	52" x 36"	SS, Single Action, b.g.
(1) Bliss 410B Toggle	450	25" & 17"	60" x 96"	Toggle, Will draw 11½"
(1) Baldwin Southwalk	500	48"	52" x 52"	Hydraulic, 4 Column
Lake Erie	750	Up to 46"	81½"x148"	Hydraulic, dbl action. Draw 22¾" (1942)
Lake Erie	1320	Up to 36"	48" x 80"	Hydraulic (1942)
(1) Toledo #185	1400	26" & 18"	72" x 72"	Toggle, will draw 13"
(1) Cecostamp 16,000 lbs.		48"	66" x 48"	Air Drop Hammer, for die stamping (1943)

MDNA MEMBER

KINGS COUNTY MACHINERY EXCHANGE

408 Atlantic Ave., Brooklyn 17, N. Y. Phones: TRiangle 5-5237, 5-5212, 5-5213

Roller Type Scalping Machine 22" Slab Capacity
#1A W&S Turret Lathes Bar Feeds
Libby 26" Turret Lathe, 4½" Hollow Spindle
#33 ExCello Ext. Thread Grinders
Norton Ext. Plain Grinder 24"x36"
Landis #3 Universal Cyl Grinder 16"x48"
Lees Bradner CT 30" Thread Millers
W.S. Bowling Contour Roll Grinder
Farnham Forming Roll 12'
Onsrud Router Model A-4-RR 84"
Moline 3 sp—Model 7D—Cylinder Borer
6 sp. Baird Chucker 15 HP AC Motor Drive

CONTINENTAL SALVAGE & MACHINERY CORPORATION

1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

SACRIFICE

GRINDER

HEALD: WITH AUTOMATIC SIZING. CAN GRIND HOLES UP TO 5½" DIAMETER, AND UP TO 10½" LONG. EXCELLENT CONDITION. SACRIFICE.

LATHE

GEARED HEAD: 21" SWING, 38" BETWEEN CENTERS. QUICK CHANGE, AC MOTOR DRIVE. PRODUCTION, NO THREAD CUTTING. EXCELLENT CONDITION. $575. BOTH OUT OF TOWN.

H. GOLDBERG 45 Astor Place N. Y. 3, N. Y.

HIGH PRESSURE HYDRAULIC PUMP

FOR HOME, SHOP AND FARM USE

Genuine Vickers constant displacement high pressure pump. Use it for any type of liquid pumping job. Will pump 400 gal. per hour at 3750 R.P.M. Precision piston type design provides 1000 lbs. per square inch pressure. Self priming. Standard thread ⅜ inch intake and discharge ports. With ⅝ inch splined shaft — just add pulley and power and you're ready to go.

HAS HUNDREDS OF USES

These pumps are brand new. Original acquisition cost approx. $100.00. Can also be used as hydraulic motor; for rams, opening doors, hydraulic lifts, etc.—also for any liquid transporting job. War surplus, but brand new. Shp. wgt. 7 lbs. Send check or money order. Satisfaction guaranteed. Postpaid in U.S.A. Each only **$9.95**

GENERAL SALVAGE COMPANY

Dept. MF-12. 2920 E. 27th St., Kansas City, Mo.

HEAVY EQUIPMENT FOR SALE

AJAX 1½", 3½" Upsetter and Forging MD
BIRDSBORO 325 Ton Vertical Press Hydraulic New 1942
BULLARD 16 6-spindle Multaumatic New 1943
CLEARING 50 Ton Hyd. Press New 1940
CRANES from 5 to 30 ton cap. 230 volts DC
DILL 20-24" Vertical Slotter MD
LAKE ERIE 500 Ton Vertical Press Hyd. New 1944
LEBLOND #2 Rifling & Reaming Machines
NILES 600 Ton Horiz. wheel press MD
NILES 100" Vertical Boring Mill 2 swivel heads, MD
NIAGARA 1000, 1200 KVA Transformers
QUICKWORK ¾", 1" cap. rotary shear MD
UNITED ENG. 2,000-ton Hyd. Steam

HARRISON MACHINERY EXCHANGE, INC.

South 4th St. Harrison, N. J.
Tel.: HUMBOLDT 2-5750, 2-5775

PRACTICALLY NEW

2—FEDERAL SEAM WELDERS

200 KVA—60 CYCLE—440 PRIMARY VOLTAGE

(1) Straight in feed, 45"x3.5" Throat
(1) Cross through feed, 45"x3.5" Throat Depth

AIR OPERATED PRESSURE TO ROLLS

Complete with GE Thyratron Seam Welding Controls. Price.....$1,500.00 ea.

WINSTON MACHINERY CO., INC.
517 South Delaware Street
INDIANAPOLIS 4, INDIANA

STOCK TOOLS — *Prompt Shipment*

BORING MILL, Hor. #0 G & L, 3" bar.
BORING MILL, Vert. 14' Niles 2 Hds., M.D.
BORING MILL, 42" King, 2 Hds., M.D.
BORING MILL, 72" N-B-P, 2 hds., M.D.
BROACH, XA Oilgear, Hor., 60" Str.
DRILL, Radial 5' Cincinnati-Bickford.
DRILL, Radial 6' American, Mtr. on Arm.
GEAR HOBBERS, 12-H Gould & Eberhardt.
GRINDER, Bronsh. "E" Thompson, 6x48" Hyd.
GRINDER, Int., No. 72-A-5 Heald, Hydraulic.
GRINDERS, Surf. Nos. 3 & 5 Abrasives.
GRINDER, Surf. Rotary No. 25 Heald.
HAMMER, Pneumatic, Nos. 4-B & 6-B Nazel.
HAMMER, Steam Drop, 2000# Chambersburg.
HAMMER, St. Forging, 6000# Chambersburg.
LATHE, 14"x6' Hendey, Tie-Bar, T.A., M.D.
LATHE, 14"x6' L & S, 12-Speed Grd. Hd.
LATHE, 22"x16' L & S, Q.C.G., T.A.
LATHE, Turret, No. 3-A W & S, 4¾" h.s.
MILLERS, Pl. No. 4, & 5 Cincinnati.
MILLER, Plain No. 4B K & T. Vert. Att.
MILLER, Thread, No. 40 Lees-Bradner.
MILLER, Duplex, 24" Cincinnati.
MILLER, No. 2—24 Cincinnati, Rise & Fall
MILLER, Univ. No. 4 Cincinnati
PLANER, 30"x30"x8' Liberty, M.D.
PRESS, S.S., 250 Ton Chambersburg, Hyd.
SHAPERS, 24" and 32", M.D.
SHAPER PLANERS, Openside, 28" Farquhar.
SHEARS, 12' x 18 ga., 11'x1½".
SHEAR, Sq. No. 372 Stoll, 72"x½".
UPSETTER, 4" National, M.D.

LANG MACHINERY COMPANY

28th St. & A.V.R.R. Pittsburgh, Pa.

Landis Type D Plain Grinder 20x48", late model.
#2 Cincinnati Centerless Grinder, old.
Kearney-Trecker 2-spindle milling machine, old.
Fay Automatic Lathe 27" centers, old.
Natco horiz. dbl end drill, machine, late model.
Crown tumbl. barrel, maple wood lined 36x65", new.
Grob saw Model 08-20 late model.
#6 Bliss punch press 125 ton cap., late model
Lindberg electric furnace 1250°, new.
Demco tapper, 3 spindle, late model.

The Perfection Steel Body Co., Galion, Ohio

FOR SALE

24-H G & E Hobber, Motor Driven.
New #4 Davis Keyseater, cutters, M.D.
6" Atlas Miller

TILLERY GEAR WORKS

West Point Georgia

Underwood tackles HIGH BREAK-EVEN POINT

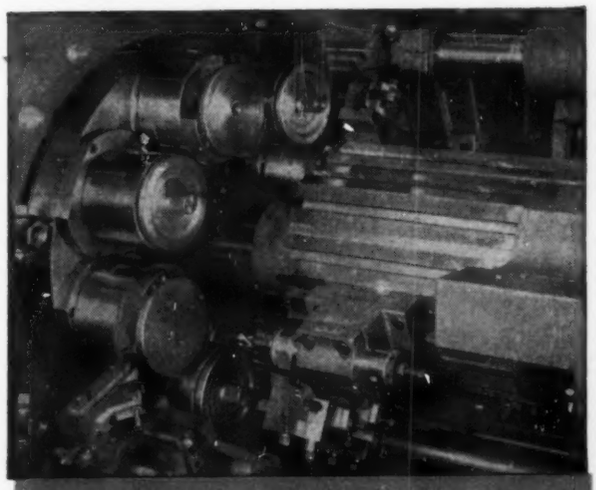
The Underwood Corporation of Hartford, Conn. is completing a far-sighted program to eliminate production inefficiencies in the manufacture of their world famous typewriters and business machines. Obsolete equipment is being replaced by fully automatic machine tools.

ON THIS PART

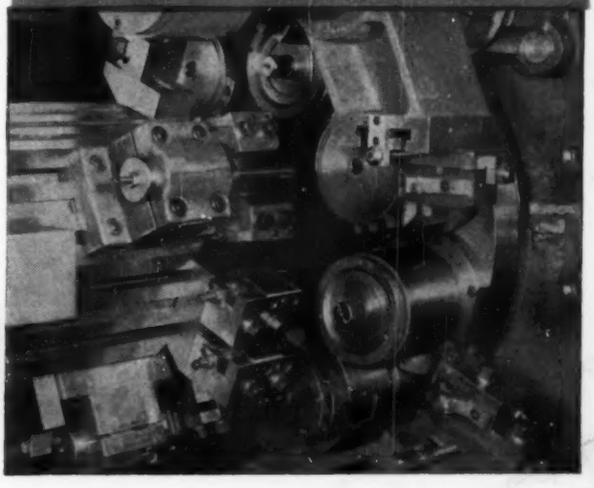
The production of the important type bar segment, illlustrated, is an example of this sensible approach to profits. It was formerly machined by six operators on four turret lathes, two engine lathes and one special grooving machine. These seven machines and six operators were replaced by one New Britain Model 88 Automatic Chucking Machine.

* RESULT

- Production increased from 90 to 120 pieces per hour
- Labor costs reduced 85%
- Quality of part greatly improved with tolerances held under 0.001"



The operations are finishing the O.D., facing both contoured sides, machining the I.D. of the hub, and trepanning wire grooves in one face. Simultaneous completion of both sides was made possible by arranging the machine for double index.



Are YOU Missing The Boat?

You can't afford to overlook the possibilities of lowering your break-even point in a similar manner. The parts you are now producing in your plant may well be produced cheaper and better on a New Britain Automatic.

The parts described in our new *Cost History* file were money-losers until New Britain engineering turned them into money-makers. Let us send you your free copy.

NEW BRITAIN AUTOMATICS COST LESS PER FINISHED PIECE

NEW BRITAIN
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

THE NEW BRITAIN MACHINE CO. NB

1248HD1

Why you're sure of UNIFORMITY with TIMKEN® forging bars

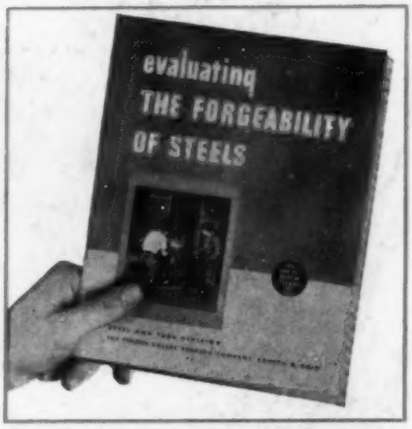
1. ***TIMKEN FORGING BARS*** have uniformly high quality, uniform forgeability, and uniform response to heat treatment.

2. ***THIS MEANS*** more consistent quality and better performance in your finished forgings, greater customer satisfaction.

3. ***PRODUCTION COSTS ARE CUT*** too—because delays, rejects and shop-practice changes are all reduced.

4. ***THIS OUTSTANDING UNIFORMITY*** is a result of the Timken Company's complete quality control—from melting through final inspection.

5. ***AND HIGHEST QUALITY*** is assured by precise control methods, specialized skill and years of leadership in alloy steel research.



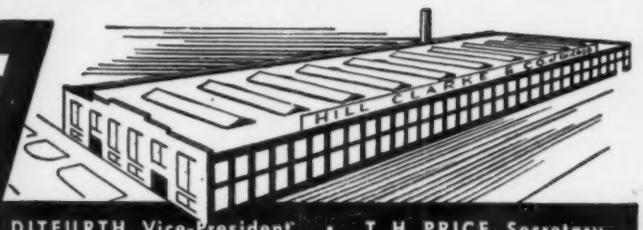
6. ***FOR HELP WITH YOUR PROBLEMS,*** call in our Technical Staff. And for data on the forgeability of steels, write for this booklet.

Write to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

HILL-CLARKE MACHINERY COMPANY



ESTABLISHED 1867 • H. W. MONS, President • W. L. DITFURTH, Vice-President • T. H. PRICE, Secretary

FOR YOUR PROTECTION ONLY HILL-CLARKE OFFERS YOU THIS 5 WAY GUARANTEE

1. A responsible organization — over 80 years experience.
2. Modern machines—no worn out equipment.
3. Every machine remanufactured or carefully inspected by experienced craftsmen.
4. You can see your machine tested under power.
5. Hill-Clarke's unconditional money-back guarantee.

● **FATHER AND SON TEAM. H. W. Mons, President, right, and E. R. Mons, Salesman, left, together offer for your service 59 years experience dealing in machine tools.**

AUTOMATICS

No. 2 Brown and Sharpe
1⅝" Greenlee, 6 Spdls. (1941)
No. 61 New Britain 6 Spdls. 1⅝" (1942)
No. 6 Brown & Sharpes

DRILLS

No. D8 Colburn No. 6 Morse Taper
No. 3—24"—1 Spdl. Allen
No. 2LMS—26"—1 Spdl. Leland-Gifford
No. 2LMS—14"—3 Spdl. Leland-Gifford
No. 3—24"—3 Spdl. Allen
No. 2LMS—26"—4 Spdl. Leland-Gifford
No. 2LMS—26"—6 Spdl. Leland-Gifford
No. 3B—24"—6 Spdl. Edlund
No. 2—8 Spdl. Leland-Gifford
No. 4—BL Natco holesteel, 36 Spdl.
7'-15" Col. American Full Universal
6'-17" Col. Fosdick Economax Radial

GEAR MACHINES

No. 7125 Fellows (1943)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 7 Fellows Gear Shaper
No. 18H Gould & Eberhardt
11" Gleason Bevel Gear Cutter
12" Gleason Bevel Gear Cutter
72" Cincinnati Gear Cutter

HOR. BOR. MILLS

No. 31 Lucas, 3" bar
Rockford, 3⅛" bar
No. 46-B Heald Borematic

GRINDERS

4"x12" Landis, Model H (1942)
4"x18" Landis Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x18" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x48" Norton Type C Plain (1943)
Norton Motor Driven Plain Grinders
6"x18" —— to —— 24"x240"
12"x36" Landis Type LCH Universal (1945)

No. 5—8"x24" Covel Hydr. Surf. (1941)
No. 34 Abrasive Surface (1943)
No. 22—12" Heald Rotary Surface
No. 25A—24" Heald Rotary Surface (1943)
36-A Hanchett Rotary Surface

72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)
74 Heald Internal Gdr. (1942)
No. 5 Bryant Internal Grinder (1942)
No. 16-16 Bryant Internal Gdr. (1942)
No. 16-38 Bryant Internal Grinder (1942)

LATHES

14"x6' Hendey Yoke Head
15"x5' Sebastian, Grd. Head
16"x54" centers LeBlond (1941)
16"x60" centers Pratt & Whitney
18"x6' American, Grd. Head
19"-38" gap x 10' LeBlond
36"x30' Lodge & Shipley
36"—48"x16' Lehman Hydrotrol (1945)
48"x20' centers Simmons (1942)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model D (1943)
10"x22" Sundstrand, Model AA (1943)
12"x18" Lipe Carbo (1942)
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 4 Cincinnati Plain (1943)
No. 08 Cincinnati Vert. (1942)
No. 2 H Milwaukee Vertical
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
24" Cincinnati Production
No. 1-18 Cinn. Mfg. (1940)
No. 2—18" Sundstrand-Electromil (1942)
No. M-24 Milwaukee Simplex (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cinn. Hyd. Tracer (1942)
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 2 Hanson-Whitney Thread
4"x9" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x80" Pratt & Whitney Thread
6"x132" Pratt & Whitney Thread Miller
6"x168" Pratt & Whitney Thread
10"x48" Hanson-Whitney Thread
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
36"x36"x16' Ingersoll Slab Miller
No. 10 Ingersoll 72"x6' Traveling Col. Face Millers (1942)
54"x54"x8' Davis & Thompson Open Side (1943)

MISCELLANEOUS

18" Dill Slotter
Model H-7 Micromatic Hydro Honer
Model H-2 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
No. 22-C Racine Shear Cut Hack Saw
8-M Wells Band Saw
No. 20 Bliss O.B.I. Press
No. 2 V & O open back press
No. 0 Bakewell Tapper
Baush Radial Tapper (1942)

PLANERS

36"x36"x12' Cincinnati
36"x36"x18' Gray, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Jones & Lamson, Bar Feed
No. 5 Warner & Swaseys (1942)
No. 5 Bardons & Olivers (1942)
No. 5 Midland, Bar Feed
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼ Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A W. & S., 7½" Hole in Spindle

FEATURE OF THE MONTH

6'-17" column Fosdick Economax Hydraulic Radial Drill, motor-on-arm centralized controls. See it under power at our plant now.

ASK FOR OUR COMPLETE LIST

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives....18-19, 24, 48

Accessories & Attachments (Machine Tool)....156, 169, 178

Arbors & Mandrels....173

Bearings....16

Books, Technical....176

Boring, Drilling & Milling Machines (Horizontal)....169

Boring & Turning Machines (Vertical).45

Broaching Machines....151

Centrifugal Machines....182

Chucks....156, 175

Cleaning & Drying Machines & Supplies....170

Counters....25

Coolant Systems, Filters & Supplies.54, 184

Cut-Off Machines; Sawing Machines..179

Die Making Machines....181

Drilling Machines....20-21, 41, 44, 59, 64, 141, 160, 173, 175

Electrical Parts & Equipment.153, 163, 164

Engineering & Production Services....168

Fasteners....36, 135, 174, 178

Gages & Instruments..30, 57, 124, 167, 170, 174, 179, 181

Gear Cutting Machines..3, 6-7, 47, 137, 168

Gears, Speed Reducers, Motor Reducers....16, 60, 165, 166, 167, 168

Gear Testers....3

Grinders—Cutter & Tool....3, 53, 55, 176

Grinding Machines—Production....5, 12-13, 177

Heads: Drilling, Grinding & Tapping..32, 123, 156, 168, 177

Heat Treating Equipment & Supplies..174

Honing Machines....148

Hydraulic & Pneumatic Parts & Equipment....157

Lathes, Automatic....22-23, 32, 49

Lathes, Engine....50, 53, 133, 139, 169

Lathes, Turret....32, 52

Lubricants, Cutting Fluids, Quenching Oils, Rust Preventives....128, 173, 178

Materials, Cutting & Forming....126, 145

Materials of Manufacture....4th Cover, 14-15, 31, 152, 161

Materials Handling Equipment....26-27, 143, 147, 154

Millers, Die Sinkers, Profilers....4, 8-9, 17, 38-39

Planers....40, 43, 46

Polishing & Buffing Machines....181

Power Transmission....16, 51, 60

Presses, Forging & Forming Equipment & Supplies....28, 35, 37, 56, 58, 156, 173, 174, 175, 181

Production, Inventory & Tool Control.150

Riveting Machines....175

Screw Machines; Chucking Machines 3rd Cover, 29, 173

Shapers, Slotters, Keyseaters....66, 175

Special Machine Tools....178

Steel Blue....179

Tapping Attachments....156

Tapping Machines....156

Threading Machines....10-11, 171

Tooling Set-Up Equipment....42, 181

Tools, Cutting..33, 52, 123, 151, 155, 159, 174, 175, 181

Tools, Hand....36

Vibration Control....130, 177

Wiping Cloths....162

ADVERTISERS INDEX

	Page
Allis-Chalmers Mfg. Co.	51
Almond Mfg. Co., T. R.	175
American Magnesium Corp.	31
American Screw Co.	135
American Steel Foundries, King Machine Tool Division	45
American Tool Works Co.	20, 21
Anton Machine Works	179
Armstrong-Blum Manufacturing Co.	52
Armstrong Brothers Tool Co.	42
Auto Engine Works, Inc.	166
Automatic Transportation Co.	143
Barber-Colman Co.	47
Barrett Co., Leon J.	182
Baumbach Manufacturing Co., E. A.	173
Bilgram Gear & Machine Works	166
Blake Co., Edward	170, 176
Boyar-Schultz Corp.	178
Brown & Sharpe Mfg. Co.	57
Bryant Machinery & Engineering Co.	43
Bullard Co.	22, 23
Carboloy Co., Inc.	145
Carlton Machine Tool Co.	175
Cincinnati-Bickford Tool Co.	59
Cincinnati Gear Co.	166
Cincinnati Grinders Incorporated	5
Cincinnati Lathe & Tool Co.	50
Cincinnati Milling Machine Co.	4
Cincinnati Planer Co.	46
Cincinnati Shaper Co.	66
Clark Tructractor Div. Clark Equipment Co.	26-27
Cleveland Punch & Shear Works Co.	28
Columbus Die Tool & Machine Co.	178
Cone Automatic Machine Co.	29
Consolidated Machine Tool Corp.	17
Davis & Thompson Co.	169
Davis Keyseater Co.	175
Dayton Rogers Mfg. Co.	179
DeLaval Separator Co.	54
Diamond Machine Tool Co.	175
Eastern Machine Screw Corp.	175
Electric Storage Battery Co.	153
Errington Mechanical Laboratory	177
Federal Machine & Welder Co.	58
Fellows Gear Shaper Co.	6-7
Felters Co.	130
Fosdick Machine Tool Co.	44
Gairing Tool Co.	44
Gallmeyer & Livingston Co.	177
Ganschow Gear Co.	166
General Electric Co., Apparatus Dept.	163, 164
Geometric Tool Co.	33
Gisholt Machine Co.	49
Gleason Works	3
Goss & deLeeuw Machine Co.	173
Grant Mfg. & Machine Co.	175
Gray Co., G. A.	40
Greenfield Tap & Die Corp.	32
Hartford Special Machinery Co.	166, 169
Heald Machine Co.	2nd Cover
Henry & Wright Mfg. Co.	37
Holman Reamer Co.	174
Hones, Inc., Charles A.	174
Hyster Co.	147
Kalamazoo Tank & Silo Co., Machine Tool Div.	179
Kearney & Trecker Corp.	38, 39
Kennametals Inc.	159
Kex National Service	162
King Machine Tool	45
Korfund Co., Inc.	177
Laminated Shim Co., Inc.	161
Landis Machine Co.	10-11
Landis Tool Co.	12, 13
Langelier Mfg. Co.	173
LaPointe Machine Tool Co.	151
LeBlond Machine Tool Co., R. K.	53
K. O. Lee Co.	55
Lees-Bradner Co.	171

ADVERTISERS INDEX

	Page
Leland-Gifford Co.	141
Liberty Planers Inc.	43
Link-Belt Co.	16
Lodge & Shipley Co.	133
Luers, J. Milton	181
McCaskey Register Co.	150
McGraw-Hill Book Co., Inc.	176
Meisel Press Mfg. Co.	168
Merz Engineering Co.	181
Michigan Tool Co.	137
Micromatic Hone Corp.	148
Modern Tool Works Div. of Consolidated Machine Tool Corp.	17
Morris Machine Tool Co.	64
Murchey Machine & Tool Co.	123
National Machine Tool Co.	175
Newark Gear Cutting Machine Co.	168
New Britain-Gridley Machine Div. New Britain Machine Co.	3rd Cover
Nicholson & Co., W. H.	173
Norton Company	18-19, 24, 48
Oliver Instrument Co.	181
Perkins Machine & Gear Co.	167
Philadelphia Gear Works, Inc.	165
Phillips Mfg. Co.	170
Potter-Johnston Co., Sub. Pratt & Whitney Div., Niles-Bement-Pond Co.	32
Procunier Safety Chuck Co.	156
Production Machine Co.	181
Reeves Pulley Co.	60
Rodgers Hydraulic, Inc.	157
Ryerson & Sons Inc., Joseph T.	152
Sales Service Machine Tool Co.	156
Scherr Co., Inc., George	167
Sheldon Machine Co., Inc.	169
Shore Instrument & Mfg. Co., Inc.	174
Sibley Machine & Foundry Corp.	160
Sidney Machine Tool Co.	139
Snow Manufacturing Co.	41
Standard Conveyor Co.	154
Standard Pressed Steel Co.	36, 174
Stuart Oil Co. Ltd., D. A.	178
Sun Oil Company	128
Timken Roller Bearing Co. (Steel & Tube Div.)	4th Cover
Unit Machinery Co.	168
U. S. Drill Head Co.	168
U. S. Hoffman Machinery Corp.	158
United States Steel Corp.	14-15
V. & O. Press Co.	174
Van Keuren Co.	30
Van Norman Co.	8, 9
Vascaloy Ramet Corp.	126
Veeder-Root Inc.	25
Verson Allsteel Press Co.	56
Waltham Machine Works	174
Webber Gage Co.	124
White & Bagley Co.	173
Wilson, K. R.	35
Zeh & Hahnemann Co.	181

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT — Page
- Positions Vacant ... 183
- Selling Opportunities Offered ... 183
- Positions Wanted ... 183
- Employment Services ... 183

SPECIAL SERVICES
- Contract Work ... 183
  - Dayton Rogers Mfg. Co. ... 183
  - General Pattern Works ... 183
  - Kamis Engineering Co. ... 183
  - Phoenix Screw Machine Co. ... 183
  - Premier Mill Corp. ... 183
  - Slocomb Corp., F. F. ... 183

EQUIPMENT
(Used or Surplus New)
- For Sale ... 184-193

WANTED
- Equipment ... 183

ADVERTISERS INDEX

- Aaron Machinery Co. ... 191
- Bennett Machinery Co. ... 190
- Botwinik Bros. of Mass., Inc. ... 188
- Brooks Inc., B. D. ... 186
- Brownell, Hazard ... 186
- Capitol Machinery Co. ... 190
- Continental Salvage & Machy. Corp. ... 192
- Dony Machinery Co. ... 190
- Eastern Machinery Corp. ... 187
- Emerman Machinery Corp. ... 184
- Falk Machinery Co. ... 185
- General Salvage Co. ... 192
- Harrison Machinery Exchange, Inc. ... 186, 188, 190, 192
- Hill-Clarke Machinery Co. ... 193
- Howarth Machinery Co. ... 190
- Hyman & Son, Joseph ... 186
- Kings County Machinery Exchange ... 192
- Miles Machinery Co. ... 188
- Morey Machinery Co. ... 189
- National Machinery Exchange ... 188
- Osborne & Sexton Machinery Co. ... 184
- Paul's Machinery Co. ... 190
- Perfection Steel Body Co., The ... 192
- Reynolds Machinery Co. ... 184
- Simmons Machine Tool Co. ... 186
- Victor Machinery Exchange ... 184
- Vimalert Co., Ltd. ... 186
- West Penn Machinery Co. ... 190
- Winston Machinery Co., Inc. ... 186, 192

American Machinist

Magazine of Metalworking Production

INDEX to VOLUME 92

January to December, 1948

★ ★ ★

Published Every Other Thursday by
McGRAW-HILL PUBLISHING CO., INC.
330 West 42nd Street—New York 18, N. Y.

★ ★ ★

AMERICAN MACHINIST INDEX

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42ND STREET, NEW YORK 18, N. Y.

CONTENTS OF VOLUME 92 JANUARY TO DECEMBER, 1948

A

Abrasives:
DoAll abrasive cut-off machines..Apr. 8 *147
Hammond Machy abrasive belt grinder Mar. 11 *214
Hoglund Engrg. wheel dresser..Apr. 8 *158
Manufacturing Co. abrasive wheel Sept. 9 *158
Matco Tool radius and angle tool dresser .....Apr. 22 *120
What to watch in metal-polishing costs. E. C. Beam.....Aug. 12 *87
Acid etching process used to cut thin-gage metals .....Dec. 16—115
Adding odd fractional dimensions. John Kaashoek .....July 29—104

Adhesives:
Adhesives for metalworking. H. E. Linsley .....Feb. 12 *107-118
General Electric Chemical Dept. Feb. 12—166
General Electric phenolic liquid adhesives .....Apr. 22—113
Air brakes—Bendix-Westinghouse finds their own air-brake cylinders can take over 500 heavy jobs. C. S. Ricker. June 17 *112

Air Compressors:
Air-Flo Compressor Co.—machine of interchangeable parts.....Dec. 2 *134
American Brake Shoe fractional-hp compressor .....July 15 *156
Grimes vertical air compressor..Nov. 18 *162
Air fixtures ease machining and assembly R. E. Whinrey .....July 15 *92
Air gun ejects thin shells. Charles Schwartz Nov. 4 *123
Air hose—Goodrich—for small tools..Aug. 26 *144
Air line operates cylinder through simple valve. Glen Shopbell.....Aug. 12 *130
Air receivers—Dayton Rogers air receivers for gases and liquids.....Aug. 12—170

Aircraft Construction:
Additional military plane orders, U. S. warnings spur plants.....Oct. 7—125
Airplane engine mounts tooled at a cost as small as possible. H. S. Wharen Mar. 11 *140
Allocation for U. S. Air Force planes Oct. 21—137
Selective shot peening extends fatigue life of propellers. Epprecht & Eberhardt .....Sept. 23 *95
Simplified machining produces complicated parts. Ecklund & Shum..Dec. 2 *96
Allis-Chalmers shop shots.....Aug. 12 *118

Aluminum:
American Nickeloid nickel and chrome plated aluminum sheet.....Aug. 26—144
Ampco Metal aluminum bronze alloy for forming and drawing dies Aug. 26—140
Defects in aluminum alloy spot-welds. C. R. Dixon.....June 17 *98
Europe tools for extrusion. John Everhart .....Dec. 2 *67
How to work aluminum and its alloys. Anderson Ashburn.....July 1 *85-100
Process sheet for anodizing aluminum (Ref. Bk. Sheets).....Mar. 25—133
Process sheet for anodizing aluminum-aluminite sulfuric-acid method. George Black. (Ref. Bk. Sheets)....June 17 *141
Special tools bore aluminum castings at high speed. B. C. Brosheer..Aug. 12 *90
Tempers for aluminum alloys pts. 1 & 2. (Ref. Bk. Sheets).....July 1 *129
Typical characteristics of some aluminum alloys (table).....July 1— 87
American Foundrymen's Assn. convention and exhibit.....June 3—126
American Gear Mfrs. Assn. meeting..July 1 *120
Semi-annual meeting.....Nov. 18—134
American Machine Tool Distributors Assn. meeting .....Oct. 7 *126
American Management Association conference .....Jan. 1—111
Makes survey.....Nov. 18—137
Meeting .....Dec. 2—109
Personnel Conference.....Oct. 7 *127
American Society of Mechanical Engineers Council discusses standardization projects .....Dec. 16—125
American Society of Tool Engineers.
Exhibitors in exposition.....Mar. 11 *127
Exposition in print.....Mar. 11 *205
Ammonium sulphide aids layout. Chris Sorenson .....July 15—127
Angles—Offset angles for chamfering. W. W. Boyd .....Oct. 21—192
Offset angle for chamfering is found with trigonometry. J. J. Hanus..Aug. 26 *108
Angle plates—see Plates
Annealing—Conveyor furnace anneals bimetal strips. C. F. Alban.....Sept. 23 *108
Anodic films brushed onto local areas. Simon & Thomas.....July 1 *103
Anodizing—Colonial Alloys process for anodizing rivets.....Aug. 26—142
Anvils—Snap-gages shop-produced with hard, dowel-pin anvils. Allan Clarke. July 15 *125
Apprentices—Apprenticeship credit for trianing gained in armed services variable Mar. 11—191
Why do apprentices quit? W. F. Patterson .....Aug. 26— 80
Arsenals—Seven arsenals step up output in new program.....Nov. 4—125
Australia—Firm calibrates instruments photographically .....May 20— 92
Austria—Credits granted to concerns in Italy, Austria .....Feb. 26—126
Automare—a poem. D. E. Youtz..Jan. 29—352
Automation—Ford handles by automation. Rupert LeGrand.....Oct. 21 *107-122

Autohobile Construction:
Automobile wheel manufacture related to plant layout and materials handling methods. H. S. Wharen....Feb. 26 *84
Ford's radical radiator production line. C. S. Ricker.....July 1 *77
How Buick builds the Dynaflow. Chester Ricker..Oct. 1 *91, correction Dec. 2— 73
How Buick makes dynaflow brakes tough. C. S. Ricker .....Oct. 7 *118
How the Jeep donned civies. D. G. Roos .....Jan. 1 *69
Lincoln-Mercury plant layout at Los Angeles .....Apr. 8 *85
Packard's tough forging jobs. Daschke & Lawson .....July 29 *73
Pad-spreading fixture speeds brake-pedal assembly for autos. C. S. Ricker. July 15 *125
Studebaker shop shots.....Jan. 1 *100
Awards—Edison Medal won by Dr. Slepian. Jan. 1—109
Axles—Cross Transfer-matic axle machine Jan. 1 *134
Cross Transfer-matic speeds truck-axle production. C. S. Ricker....Jan. 15 *94
Axelson Mfg.—simplified control reduces paper work.....Feb. 26 *92
Azimuth plate rechecks dividing. F. E. Clarke Jan. 1 *104

B

Backstop—Falk Corp. backstop prevents reverse rotation.....May 6 *162
Balancers—Aro Equipment balancer for portable tools.....July 29—140

Balls
Attached mechanism loads balls in predetermined lot numbers. Joe Manuiss Apr. 8 *122
Ball and socket joint—fixture produces holes using locomotive principle. C. T. Bower .....Feb. 12 *130
Koehler & Sons machine will flash, grind or lap balls.....Apr. 22 *118
Spherical-turning lathe tool cuts precision ball and socket elements. A. B. Nixon Jan. 15 *119
Barrel tilt—Palmer-Shile drum and barrel tilt .....Feb. 12 *164

Bars:
Hook rig transfers steel bars from furnace to quenching bath.....May 20 *118
Rules for upsetting bar stock (Ref. Bk. Sheets) .....Jan. 1 *123
Weight of steel bar for 1,000 pieces (Ref. Bk. Sheets).....Apr. 8 *141
Bases—see Mountings
Beading—Hydraulic units power machine elements. L. W. Court.....Aug. 12 *83

Bearings:
Align honing eliminates bearing scraping. H. E. Linsley.....Jan. 15 *88
Baffled ladle lid skims dross and saves metal. F. M. A'Hearn.....Jan. 15 *123
Barden Corp. ball bearings....Dec. 2—140
Converted grinder forms arcs to finish bearing cap surface. George Werner May 20 *117
Diesel bearings cast in sheet-metal flasks. C. O. Donley.....Nov. 4 *89
Federal Bearings XLS product..July 29—144
Housings for bearings drilled with rail fixture. L. C. Heinlein.....Jan. 17 *114
How to handle lignum-vitae. H. E. Linsley .....June 17 *122
Liquid nitrogen simplifies bearing assembly. R. E. Bludeau.....Dec. 16 *82
Mass precision.....Dec. 2— 82
New Hampshire Ball Bearings..June 3 *156
PalVin Machine & Mfg. radial type bearings .....Feb. 26 *154
Paraffin "freezes" ball bearing for minor i.d. or o.d. grinding. Don Cameron Mar. 25 *120
Practical inspection lowers scrap and rework in ball bearing plant. Jack Shafer .....Dec. 16 *112
Precision Products pillow blocks Aug. 12 *168
Rollway Bearing cylindrical bearings June 17 *166
Timkin Roller Bearing tapered bearings Apr. 8—162
Tubes keep ball bearing clean. A. M. Murray .....July 1 *102

Belting:
Armstrong-Bray belt conveyor fasteners Oct. 21—170
Behr-Manning heat resisting dry grinding belt.....Oct. 21—154
Hewitt-Robins Raynile fabric conveyor belt .....Nov. 4—160
Mannheim Mfg. & Belting packaged belting .....Feb. 12—164
Minnesota Mining & Mfg. resin-bond cloth belts.....Nov. 18—178
Raybestos-Manhattan v-belt....July 15 *156
U. S. Rubber Royal Super Service V-belt .....June 17—164
Bench backstand—Hammond Machy. Builders .....Aug. 12 *164

Bending:
Bend allowance chart. (Ref. Bk. Sheets) July 29 *125
Elmes Engrg. Works tube bending press Oct. 7—146
Kellogg pipe-bending machine....Sept. 9 *158
Small lever bent in fixture. C. H. Willey May 20 *119
Bendix-Westinghouse finds their own air-brake cylinders can take over 500 heavy jobs. C. S. Ricker....June 17 *112
Bicycle of light alloy pressings....May 20 *123
Binoculars—1-oz binocular shell machined to close tolerances. Anderson Ashburn July 15 *89

Bins:
Notched bins handle crankshaft..Apr. 22 *93
Palmer-Shile all steel storage bin. June 3—140
Racks and bins aid raw material warehousing. R. O. Fristoe.....Aug. 12 *116
Stackbin Corp. adjustable hopper June 17 *152
Stock sizes in bins to speed correct selection. Henry Gifford.....Apr. 22 *99
Blast gun—Engineered Products gun Dec. 16 *148

Blocks:
Carbon blocks simplify welding jobs. Phil Glanzer.....Oct. 21 *124
Cross cylinder block assemblies Oct. 21 *158
Davis Development slotted hardwood blocks .....Feb. 12 *158
Drilled-block feed cools cutoff. J. J. Moffatt .....Feb. 28 *117
Setup block holds flat parts. W. Laycock Feb. 26 *118
Sheffield Corp. gage blocks....Mar. 25 *152
Stilts stretch radials to fit. B. C. Brosheer .....Aug. 12 *93
Two shim blocks ease clamping. S. Framurz .....Aug. 26 *112
V-blocks have unlimited uses. L. H. Hardcastle .....Feb. 12 *131
Wood block groups small tools with die identification label. K. C. Valentine Mar. 25 *120
Blueprinting—General Analine & Film Corp. blue print machine.....Oct. 7—152
Boilers—Combustion Control flame-failure protection .....July 15 *154
Bolster, pre-drilled press.....June 17 *92

(*) Illustrated (ed) Editorial

Bolts:
Boyar-Schultz special machine bolt Dec. 2—142
Cold heading cuts manufacturing costs. C. S. Ricker....Feb. 26 *89
Fixture clamps clutch bolts for grinding radius. J. V. Tyler....Oct. 2 *123
Bonderizing—Continuous bonderizing doubles output. J. W. Lynch....June 3 *87
Bonding—Adhesives for metalworking. H. E. Linsley....Feb. 12—*107-118

Book Reviews:
Adventures in business. N. F. Wilson Mar. 25—176
An introduction to metallurgy (sec. ed). Prof. J. Newton....Jan. 15—177
Apprenticeship revitalized. Edward E. Goshen....Aug. 12—186D
Approved equipment from industrial fire protection—Associated Factory Mutual Fire Ins. Cos....Jan. 1—158
Bentley's Machine shop companion—Bentley Pub. Co....Apr. 22—152
Design of metal cutting tools. F. L. Woodstock....June 17—194
Dimensional analysis of engineering designs Vol I components (Part 1)—His Majesty's Stationery Office, London....Sept. 9—192
Elementary & applied welding. Rigsby & Groneman....Sept. 23—186
Engineering applications of fluid mechanics. Hunsaker & Rightmire....Mar. 11—245
Engineering materials. A. H. White Dec. 2—170
Engineering organization and methods. J. E. Thompson....May 20—175
Filing systems for engineering offices. Engrg. Societies Library....June 17—193
Hot-dip galvanizing practice—W. H. Spowers....Apr. 22—153
How to draw technical illustrations. Linsley & Hawkins....Sept. 23—188
How to prepare and maintain a supervisors' policy manual. Amercian Mgmt. Assn....Mar. 11—246
How to take industrial photographs. Zielke, & Beezley....May 6—171
Human relations casebook for executives and supervisors. Drake & Drake Mar. 11—245
Induction heating in relation to industrial gas heating. Amer. Gas Assn..June 17—193
Industries answer right. C. Z. Smith Jan. 15—177
Industrial applications of infrared. J. D. Hall....Mar. 11—244
Industrial electronics maintenance. R. C. Rootger....Jan. 15—176
Introduction to tool engineering. H. F. Owen....Sept. 23—188
Isometric drawing explained. G. H. Pearson....Mar. 11—247
Jet propulsion progress. Neville & Silsbee....May 20—175
Job evaluation. Otis & Leukart. Mar. 25—178
Labor relations and human relations. S. M. Selekman....Mar. 25—176
Machine design. P. H. Black..Dec. 16—172
Machine design. M. F. Spotts—Oct. 7—186
Magnetic control of industrial motors. G. W. Heuman....Jan. 1—156
Materials handling—General Electric Co....Sept. 9—172
Mechanical vibration. J. P. Den Hartog....May 20—174
Mechanics. Slater & Frank....Jan. 1—158
Mechanics of machinery. Hamm & Crane Oct. 7—186
Methods-time measurement. Maynard, Stegemerten & Schwab....Oct. 7—185
Metric system of weights and measures comp. by Nat'l. Council of Teachers of Mathematics....Dec. 16—172
Modern Management practices and problems. American Mgmt. Assn...Apr. 8—182
1947 Metal finishing guide book. Metal Finishing....Jan. 15—176
1947 Supplements to ASTM standards. Amer. Society for Testing Materials July 29—160
Non-ferrous production metallurgy (see ed.). J. L. Bray....Jan. 15—177
Pattern for good labor relations. L. H. Hill....Mar. 11—247
Planning factory maintenance. F. D. Denner....Apr. 8—184
Plant layout techniques. J. R. Immer May 6—170
Power metallurgy, its physics and production. Dr. Paul Schwartzkopf & others....Jan. 1—158
Principles of industrial management. E. A. Allcut....Apr. 8—182
Principles of personal testing. C. H. Lawshe, Jr....June 17—194
Problems in drafting and design. F. L. Goff....Jan. 15—176
Problems in engineering drawing series II. Levens & Edstrom....Jan. 15—176
Professional registration laws and the engineer. A. M. Sargent....Nov. 4—182
Quality control. N. L. Enrick..Sept. 9—191
Quality control methods. C. W. Kennedy....Aug. 12—186D
SPI Handbook. Society of the Plastics Industry....Mar. 25—176
Some basic techniques in materials handling. Clapp & Poliak....July 29—160
Standard welding symbols 1947. American Welding Society....May 20—172
Starting a small machine shop. F. A. Colvin....Mar. 11—245
Technical descriptive geometry. B. L. Wellman....Aug. 12—186E
Telling employees about business operations; profits. Metropolitan Life Ins. Co....Oct. 7—185
Tool steels simplified. Palmer & Luersen Apr. 22—152
Turning and boring practice. Colvin & Stanley....Dec. 2—170
Wear and surface finish. E. L. Hemingway....May 6—172
What Electronics does. Zeluff & Markus June 17—193
Who, Me? A. O. England....Sept. 9—191
Work and effort. T. A. Ryan..Jan. 15—177
Work routing, scheduling and dispatching in production. Younger & Geschelin....Mar. 11—246
Yearbook of the American Iron & Steel Institute....Jan. 1—156
Booster—Sage Equipment portable booster May 20 *140

Boring and Boring Machines:
Aero Tool spiral-fluted countersink Dec. 16 *146
American Steel Foundries boring and turning machines....Oct. 7 *141
Bardons & Oliver cutting, boring and drilling machine....April 8 *147
Boring bar cuts internal sphere with link-driven rotating tool. A Wagner May 6 *127
Boring-bar holder on compound handles drilling and threading. Alois Steiner Aug. 12 *129
Boring-mill fixture sets up die inserts for arc cut....Dec. 2 *103
Boring tools cut accurate holes. R. G. Redmayne....July 29 *112
Carboloy carbide boring bar machine July 15 *152
Clark Transfer-matic speeds truck-axle production. C. S. Ricker....Jan. 15 *94
Consolidated Machine Tool car wheel borer....Oct. 21 *148
Cosa Corp. boring and milling machine Mar. 11 *205
Criterion Machine Works distribution May 6 *152
Cross Transfer-matic four operation machine....July 29 *132
Damped quill stops self-excited chatter. E. J. Tangerman....May 6 *93
Drillpress heads bored in miller with fly cutter and shell reamer. G. C. Russell....Aug. 26 *108
Electro Arc Mfg. boring machine June 3—146
Erickson Steel boring and reaming tool Dec. 16—154
Gear housings bored on angle-plate setup Dec. 2 *101
Grouped parts multiple-machined. F. H. Scribner....Apr. 8 *90
Hanson holding fixture for jig boring Feb. 26 *152
Hauser Machine Tool jig boring machine....Sept. 9 *148
Heald boring cycle with 14 operations finishes motor housings....Sept. 23 *130
Heald Machine Bore-Matics machine July 29 *138, Aug. 26 *129
Heald Machine Multi-Way Bore-Matics machine....Jan. 15 *145
Heaters help accuracy of boring machine. R. T. Rudolphson....July 15 *96
Internal collet grips turning for close concentric machining. G. W. Brown Feb. 26 *118
Lathe spider supports cylinder while counterbore work is done. R. J. Lemp. Apr. 8 *123
Maxwell boring and facing tool Mar. 25 *148 May 20 *146
Maxwell boring tools....Dec. 2 *132
Moore Special Tool boring and grinding machine....Oct. 21 *154
National Automatic Tool vertical machine for drilling, boring and tapping Nov. 18 *147
Navy devises ingenious planer and boring-mill setups. Rupert LeGrand Oct. 7 *96
Radials cut boring costs 24.3% Dec. 16 *109
Sapphire tip bores bushing. G. C. Scott July 29 *83
Simplex Machine Tool precision boring machine....Oct. 21 *160
Slotting replaces broaching in end of boring bar. Roger Isetts....Dec. 2 *106
Special tools bore aluminum castings at high speed. B. C. Brosheer..Aug. 12 *90
Speeds and feeds for boring (Ref. Bk. Sheets)....Feb. 12—149
Staggered quintet of boring bits rough and finish pump-body holes. G. R. Milner....Sept. 23 *131
Stokerunit Corp. Simplex 2U machine May 6 *150
Stubby boring-tool holder backs up heavy cuts rigidly. F. C. Lurz Aug. 26 *111
Tapered flat on boring-bar arbor guides boring tool in liner. C. D. McKinnon Oct. 7 *120
Tool fixture produces spherical holes using locomotive principle. C. T. Bower....Feb. 12* 130
Tree Tool & Die Works taper boring tool....Feb. 26 *148
Uses for double-end tool boring (Ref. Bk. Sheets) pts. 1 & 2....Mar. 11 *199
Use of single-tool boring tools (Ref. Bk. Sheets) pts. 1, 2 & 3...Feb. 26 *133
Weddell carbide boring bit....Mar. 11 *210
Work loaders applied to machine tools. Rupert Le Grand....Mar. 11 *150
Boxes—Palmer-Shile corrugated box..July 29 *140

Brakes:
How Buick builds the dynaflow. Chester Ricker—Oct. 21 *91, correction Dec. 2— 73
How Buick makes dynaflow brakes tough. C. S. Ricker....Oct. 7 *118
Knight Machy. press brake....Dec. 2 *126
Knight Machy. welded press brakes June 17—150
Pad-spreading fixture speeds brake-pedal assembly for autos. C. S. Ricker July 15 *125
Stearns Magnetic Mfg. disk brake Nov. 4 *146
Brass—Wire, machines and processes mean better cold headed brass. W. D. France Feb. 12 *96

Brazing:
Dow Chemical process for brazing magnesium....Oct. 21—168
Furnace-brazed assemblies replace one-piece units. H. M. Weber....Sept. 9 *92
Radio frequency generator handles brazing and hardening. Dr. R. A. Nielsen Nov. 18 *112

Broaching and Broaching Machines
Acme Broach Corp. horizontal hydraulic machine....July 1 *142
American Broach & Machine hydraulic pull-up model....May 6 *142
American Broach & Machine hydraulic vertical machine....July 1 *134
Broach-tap cuts quintuple threads. H. S. Wharen....Apr. 22 *69
Colonial Broach machine....Nov. 4 *154
Colonial Broach sharpeners....Oct. 21 *156
du Mont Minute Man broach kit June 3 *150
Greenerd Arbor Press broaching machine Oct. 21 *158
Grip protects hands. S. Lees....June 17 *126
Handbook of horizontal broaching fixtures. B. O. Brosheer....Dec. 16 *93-108
Shearcut Tool rotary broach....Nov. 4 *146
Splines cut by set of broaches using single progressive edges. Harry Stern Mar. 25 *120
Tricky tooling cuts relay costs. Paul Bonness....Jan. 1 *93
Typewriter-carriage frames broached without distortion....Nov. 4 *118
Vertical surface-broaching fixtures. B. C. Brosheer....pt. 1 Jan. 1 *77
pt. 2 Jan. 15 *101
Work loaders applied to machine tools. Rupert Le Grand....Mar. 11 *151
Zagar Tool keyway broaching machines Oct. 7 *141
Bronze—Hewson, John Co. bronze-base alloy Oct. 7 *156
Burners—Scientific Research Flash-Circle burner....July 1—142
Burring—Tool burrs small hidden holes. R. J. Chrosmiak....Feb. 12 *129

Bushings:
Carboloy crabide bushings....Sept. 23 *166
Concentricity held to a tenth. David Olson....July 15 *123
Kennametal Grade K6....Dec. 2 *144
Meyers drill-jib bushings, carbide inserts....Jan. 1 *140
Removing bushings in blind holes. Hans Schmidbauer....Apr. 8—126
Sapphire tip bores bushing. C. C. Scott July 29 *83
Button holders solve "impossible" layout problems. Frederico Strasser....Jan. 1 *103

C

Cadmium plating process sheet. George Black (Ref. Bk. Sheet)....Feb. 12—145

Calculators:
Edmunds Rapidadd chart adds and subtracts....May 6 *154
Elemoto Sales dimension calculator Feb. 26—154
Hanson-Van Winkle-Munning plating computer....Nov. 18—154

(*) Illustrated (ed) Editorial

Shop shots at Friden.....Feb. 12 *98
Calibrating instruments photographically May 20— 92

Calipers:
Caliper leg mounts indicator. W. A. Dice .....Nov. 4 *122
Caliper made into sheave gage. C. A. Yard .....Oct. 7 *121
Scherr rustless-chrome vernier caliper May 6 *146
Stebar Magna Eye for use on vernier scales .....Nov. 18 *156
Vernier caliper measures radii of partial sections. C. T. Bower.....Dec. 2 *105
Woodsworth Specialties Corp. indicator caliper .....Mar. 20 *138

Cams:
Geared disk-cam holder matches feed and rotation for milling. C. T. Bower July 29 *110
Master bases cut fixture costs. Herman Goldberg .....Dec. 2 *83-90
Milling machine cuts slotted cams using removable fixtures on table. F. C. Lurz .....Apr. 8 *121
Rise on cams is turned in lathe with templet-and-follower setup. Burl Mansberger .....May 20 *119
Turret-lathe attachment produces cams with roller and tool holder. W. Lewis Aug. 12 *129
Capacitors—Aerovox Corp. motor capacitors Sept. 9 *172
General Electric Pyranol motor capacitor Oct. 7 *162
Capital expenditures in metalworking industry in 1948 (charts).....Jan. 29—109

Carbides:
Aber Engrg. Works carbide tipped milling cutter.....Apr. 8 *154
Allegheny Ludlum Steel sintered carbide alloy .....Oct. 21—176
Carbide bit has four edges. Walter Dimitruk .....Dec. 16 *123
Carbide drills. F. W. Lucht (Ref. Bk. Sheets) pts. 1, 2 & 3.....June 3 *133
Carbide tool routs Fiberglas....Feb. 26 *83
Carboloy carbide bushings....Sept. 23 *166
Chicago Latrobe Twist Drill Works drill Apr. 22 *128, Aug. 26—130
Cook Mfg. carbide tipped tools...Mar. 25—146 May 20 *140, Aug. 12 *164
Copper machining speeded by carbide tools. C. R. Morgan.....Oct. 21 *102
Eclipse counterbore tungsten carbide drive .....Mar. 11 *214
Gairing Tool E-Con-O-Mill carbide face mill .....Jan. 1 *140
How carbide tools are handled in Finland. Hans Branders.....Aug. 12 *96
How to grind and lap carbide die parts. correction, Mar. 25—115
How to machine vitallium. Jess Sdano Nov. 18 *96
Howald Machine Works carbide end mills .....Sept. 23 *152
Inserts of carbide rejuvenate plastic transfer molds. A. L. Pranses June 17 *95
Kennametal cemented-carbide metal Jan. 1—144
Myers carbide-inserted drill-jig bushings Jan 1 *140
Meyers carbide-tipped circular saws Feb. 12 *156
Moisture in cutting oil for carbide tools .....Jan. 15—100
Screw-machine form-tool step protects carbide-tool insert. W. E. Allan June 3 *121
Screw machines wear better with carbide feed rolls.....Oct. 21—125
Severance Tool Industries carbide midget mills .....Oct. 21 *154
Sharpening carbide reamer (Ref. Bk. Sheets) pts. 1, 2 & 3.....Aug. 26 *123
Super Tool carbide tool bit....June 17—160
Super Tool carbide-tipped drills Jan. 15 *152 Aug. 12 *156
U. S. Carbide Tool carbide tipped reamers .....Dec. 16 *152
Viking Tool carbide tools....July 15 *141
Weddell Tools carbide boring bit Mar. 11 *210
Weddell Tools carbide cutter blades July 1—146
Wickes Bros. crankshaft turning machine uses carbides.....May 6 *146
Wickman Corp. chip-breaker wheel grinds grooves in carbide tools....Mar. 11 *210
Carbon blocks simplify welding jobs. Phil Glanzer .....Oct. 21 *124
Cardomatic process controls milling of dies Dec. 16—128
Carts for gathering chips from automatic machines. R. E. Whinrey....July 29 *106

Castings:
Aluminum casting and forging..July 1 *94
Centrifugal process improves investment castings. V. S. Lazzara....Aug. 26 *93
Chain and belt conveyors handle die-cast products. B. C. Brosheer June 17 *116
Continuous bonderizing doubles output. J. W. Lynch.....June 3 *87
DCMT Sales Corp. die casting machine Feb. 12—152
Dynaflow rotors cast in plaster molds. Chester Ricker.....Nov. 18 *120
How to weld zinc-base die castings. Larry Phillips.....Dec. 2 *72
Hydraulic Press Mfg. die casting machine .....Oct. 7 *152
Kux Machine die caster.....Nov. 18 *152
Kux Machine standard die-casting machine .....Nov. 18 *152
Light-Metal Machy die-casting machine Aug. 26 *136
Precision dies mass-produce die-castings. H. E. Nagle.....Dec. 16 *77
Precision investment castings improved by foundry methods. K. R. Geist June 3 *83
Shop tests for identifying cast irons (Ref. Bk. Sheets).....Nov. 18 *143
Special tools bore aluminum castings at high speed. B. C. Brosheer Aug. 12 *90
Tool angles for machining Meehanite castings (Ref. Bk. Sheets)....Nov. 4 *139

Centering Machines:
Centering device locates keyways on tapered shafts. W. M. Halliday Jan. 15 *122
Centering fixture aligns shafts for keyseating. E. F. Abel.....Dec. 2 *104
Mueller Industries self-centering device .....June 3 *144
V-tapered rollers center bars for punching. H. Moore.....Oct. 21 *130
Chatter—see Vibration
Checker—Sheffield Corp. automatic checker Dec. 30 *136
Chicago Technical Societies Council Apr. 8—134
Chimney bands produced with economical tooling methods. J. J. Reich....Sept. 9 *125

Chips:
Chip-handling department serves twenty-two automatics. R. E. Whinrey July 29 *106
Conveyors, chutes and hoists mechanize chip handling. R. C. Becherer Sept. 9 *120
Morse Twist Drill & Machine Mar. 11 *210
Vibrator loosens chips. J. L. Villard Jan. 15 *124
Chrome-pickle treatment applied to magnesium stock. George Black (Ref. Bk. Sheets).....Oct. 21 *141
Chromium—Process sheet for chromising steel. George Black (Ref. Bk. Sheets). July 29 *123
Process sheet for decorative chromium plating. George Black (Ref. Bk. Sheets). .....Mar. 11 *203
Chronocyclegraph sells motion study Sept. 23—107

Chucks and Chucking Machines:
Air motors operate scroll chucks on milling fixture. L. C. Heinlein..Aug. 26 *77
Bayonet chuck. H. G. Berndt....Jan. 1 *108
Boyar-Schultz collet chuck....Nov. 18 *152
Brown & Sharpe Mfg. magnet type chucks.....July 1 *133
Chuck device set in T-slot locates center-punched stock. H. Moore Aug. 26 *109
Chuck jaws ground true. Chris Sorenson June 17 *130
Chuck-jaw inserts cut scrap pile and improve quality of production. R. H. White.....Sept. 23 *132
Converted chucking jaws hold bar stock securely. Charles Durante...Mar. 11 *187
Cushman Chuck air cylinders for chucking.....May 20 *150
Erickson Tools collet chuck....Aug. 26—144
Goodwin Mfg. collet chucks....July 29 *142
Goodwin Mfg. collet chuck for drilling, tapping.....Dec. 16 *152
Goodwin Mfg. motor mounted collet chuck.....Nov. 4 *162
Lathe chuck holds balls. L. H. Hardcastle.....Jan. 1 *107
Lathe work remounted in chuck. Frederico Strasser.....July 1—116
Porst Bros. Mfg. collet chuck..May 20 *138
Ring-and-clevis setup clamps chuck jaws for end grinding. M. H. Ball..Sept. 23 *133
Robbins Engrg. Magna-Sine magnetic chuck.....July 1 *140
Rockford Magnetic Products Viking chucks.....Mar. 11 *216
Ronald Martin collet chuck.....June 3 *154
Setscrew chuck grips odd shapes. T. G. Hicks.....Oct. 21 *130
Shims check chuck shaving. Rolland Stanford.....June 17—126
Soldered-brass chuck jaws protect finished pieces. A. B. Nixon....Jan. 15 *122
Universal chuck tips. Charles Homewood Dec. 2 *106
Zagar Tool collet speed chuck..Nov. 4 *158
Chutes aid work ejection. H. S. Wharen Apr. 4 *88

Circuit Breakers:
General Electric breaker.....Mar. 25—154
General Electric controllers with air circuit breakers.....Dec. 30—136
Square D circuit breaker panelboard. Aug. 12 *156

Clamps:
Angle irons clamp stock in saws. Bernard Levowich .....July 1 *114
Ball bearing and drill shank clamp disks in thrust setup. C. E. Caple..Sept. 9 *128
Bearing shell held by clamp for oil-groove machining. R. R. Waech....Oct. 7 *124
Cam clamping V-block fixture holds bar stock for machining. A. B. Nixon Aug. 26 *111
Dog clamps end of work. George Wilson July 1 *113
Eccentric pins level work on cylinder grinder. H. W. Cutting.....Dec. 16 *122
Extended screw improves clamps. Henry Rasmussen.....Feb. 26 *119
Fixture clamps clutch bolts for grinding radius. J. V. Tyler.....Oct. 7 *123
Four clamps set by tapered cams. F. W. Duce.....Oct. 21 *129
General Welding toggle clamp..Jan. 1 *140
Hacksaw fixture clamps bars. J. J. Reich.....Sept. 9 *126
Industrial Clutch base for jig drilling.....Sept. 9 *148
Lapeer Mfg. air operated clamp..Dec. 16 *142
Push-and-pull clamp.....Oct. 7 *160
Toggle-action air operated clamp Dec. 30 *136
Master bases cut fixture costs. Herman Goldberg .....Dec. 2 *83-90
Methods of work clamping (Ref. Bk. Sheets) pts. 1, 2 & 3.....Apr. 22 *107
Mold plate gripped for lifting by internal wedging of clamp. F. G. Forquer.....Apr. 8 *124
Pneumatic muscles clamp and assemble. C. S. Ricker.....June 17 *112
Setup block holds flat parts. W. Laycock.....Feb. 26 *118
Toggle clamp fits in T-slot. B. D. Campbell.....Dec. *106
Wing bolt clamps drill pad. T. M. Shortell.....Nov. 4 *124
Clapper-box side play halted by brass screws. A. D. Rayment.....Dec. 16 *121

Cleaning:
American Wheelabrator & Equipment Tumblast cleaner.....July 29 *134
Apothecaries Hall AhCOliod cleaner July 29—144
Armstrong Chemical & Machine metal cleaning and finishing machine. Dec. 16 *148
Blast cleaning prepares surfaces for finishing. L. J. Wieschhaus.....Sept. 9 *81
Circular layout of a parts washer. Feb. 26 *115
D & M Products, Inc., pressure washer Sept. 23 *154
Detrex Corp. hand operated degreaser Nov. 18 *166
Detrex Corp. unit for cleaning metal parts.....Nov. 18 *166
Hanson-Van Winkle-Munning six cleaners.....Dec. 30—158
Hartman Corp. chemical cleaner..Jan. 1 *136
Honan-Crane sump cleaner.....May 6 *150
How to finish copper and copper alloys. R. W. Belfit & others.....Feb. 26 *95
Koch Gyra-Flow cleaning system. Feb. 12 *152
Livingston Engrg. steam cleaner..Oct. 7—154
Magnus Chemical Krazy Dip cleaning machine.....Oct. 7 *142
Northwest Chemical emulsion cleaner Oct. 7—158
Oakite Products chemical cleaner and deodorizer.....July 1—148
Oakite Products general cleaning product.....Dec. 2—146
Oakite Products solvent cleaner..July 15—154
Phillips Mfg. Rotomatic vapor degreaser Dec. 16 *154
Portable steam generator cleans presses and other tools. B. C. Higgins..July 1 *111
Protectoseal automatic parts washer Nov. 4 *144
Rossaul Copper-Brite solution....Feb. 12—166
Schaffner Industries waterless cleaner Dec. 16—165
Turco Products cleaning unit....Nov. 4 *142
Clock, alarm, starts plating-tank heat. Bernard Lovowich.....Dec. 30 *115

Clutches:
Edgemont Machine clutch for V-belt pulleys .....Aug. 12 *170
Johnson Machine Maxitorq floating-disk clutch.....Apr. 22—113
Magnetic clutch.....May 6—121
Morse-Bickford friction clutches Aug. 12—170
Saginaw centrifugal clutch....Sept. 23 *164
V-Belt Clutch drive and clutch unit May 6 *156
Wichita Falls Foundry & Machine friction clutch.....June 17 *162

Coatings:
Acryvin Corp. Acraclad finish..Jan. 15—160
American Chemical Paint aluminum coating.....Dec. 30—160
Bertsch Machinery roll-coating machine Oct. 21 *162
Christian Engraving plastic decalcomania Dec. 30—158

(*) Illustrated (ed) Editorial

Colonial Alloys oxide coating....Feb. 12—166
Dennis Chemical Laboratories pack-hardening paste.....Nov. 4—156
Dennis Chemical metal lacquer coating Aug. 12—170
Detrex Corp. PRD coating compound Feb. 26—154
Enthone liquid plastic coating...Sept. 9—173
Harvill Mfg semi-air die casting machine.....May 20 *142
Industrial Metal Protectives Zincilate coatings.....Mar. 25—158
Johnson & Son water-emulsion wax coating.....Sept. 9—173
Kano Laboratories rust preventive coating.....June 3—158
Kellogg Kel-F thermoplastic material Nov. 4—162
Morton Chemical Duramite paint and coatings.....Aug. 12—168
Sherwin-Williams Superclad finish.... Oct. 21—172
Skybryte Sky No-Glare material. July 15—156
State Chemical transparent coating.... May 20—154
Watson-Standard Peelcote coating.... Feb. 12—166
Whitman Vitroseal coating.....Jan. 15—160
Coils—How to design work coils for induction heating. Griffith & Skiba..... Aug.12 *99-110
Cold heading—Cuts manufacturing costs. C. S. Ricker.....Feb. 26 *89
Fundamentals of cold heading. H. E. Linsley.....Apr. 8 *99-110

Collets:
Internal collet grips turnings for close concentric machining. G. W. Brown Feb. 26 *118
Matco Tool collet head.....Apr. 8 *158
Nichols Machine & Engrg. collet closer Dec. 2 *124
Sheffield Collet SM Master collet pad June 3 *160
Shell Machine spiral-grip collets..... Apr. 8—160
Zagar Tool internal expanding collet Oct. 7 *148

Comparators:
Ames dial comparator.....Aug. 26 *138
Comparator chart layout checks involute gears. F. E. Browning.....May 20 *48
General Electric surface-roughness comparator.....Nov. 4—148
Jones & Lamson Machine bench-type optical comparators.....Apr. 22 *116
Jones & Lamson Machine pedestal comparator .....Mar. 11 *206
Jones & Lamson Machine projection lens for comparators.....June 17 *152
National Automatic Products Swanson comparator.....Sept. 23 *162
Standard Gage Model 108.....Jan. 1 *138
Universal Engraving & Colorplate comparator checker.....Dec. 2—130
Universal Engraving Colorplate staging fixture used with comparators..Nov. 4—142
Comparators—see also Gages and Gaging

Compasses:
Automatic pencil aids compass for colored-line layout work. Roger Isetts Mar. 25 *119
Dividers make layout from hole as bearing ball locates center. Norman Ingalls Apr. 8 *124
Pantograph leg linkage adapts special compass for blueprinting. C. T. Bower Nov. 18 *127

Compounds:
Autectic Welding Alloys paste for molten alloys.....Aug. 12—170
Hanson-Van Winkle-Munning Surbrite steel surface conditioners....Mar. 25—160
Necamp Metallurgical Laboratories powder compound.....May 20 *134
Northwest Chemical compounds for drawing steel.....May 6—162
Sulflo varied specialties.....Feb. 12—164
Computor simplifies alignment of couplings. Glenn Marek.....Dec. 2 *74
Concentricity of bushings held to a tenth. David Olson.....July 15 *123
Condenser is a 72 ton unit.....Dec. 2 *110
Connecting rods—Pistons and connecting rods machine-assembled at Rouge Plant of Ford Motor Co. C. S. Ricker..Apr. 8 *111
Contactors—Ward Leonard Electric solenoid contactor.....Apr. 8 *162
Containers—Continental Can paper cups Sept. 23 *162
Contracts—Military renegotiation formula drawn up for control of profits Aug. 12—131

Controllers:
Arma Corp. synchro control units. Nov. 4 *156
Automatic assembly jumps output 47 times. Paul Bonness.....May 6 *96
Bendix-Westinghouse Automotive Air Brake.....Mar. 11 *218
Clark Equipment foot control for trucks Sept. 9—175
Electric-Arc recorder and controller Dec. 2 *138
General Electric amplidyne control unit Jan. 15 *160
Controllers with air circuit breakers Dec. 30—136
Motor-control .....June 17 *158
Gordon temperature control instruments, Xactline-Capacitrol.....Dec. 16 *162
Griswold Mfg. Scan-a-scale measure device control.....Dec. 16 *144
Huppert stepless input temperature controller.....Mar. 11 *226
Kux Machine push button control Feb. 26 *148
Speed Selector speed control....Aug. 26 *142
Square D AC and DC reversing contactor controls intermittent duty motors Oct. 21 *168
Square D circuit breaker panelboard Aug. 12 *156
Square D control center.....Dec. 30 *152
Switch-O-Matic reversing control.. Apr. 22 *118
Weltronic welding controller....Oct. 21 *174
Wilson Flex-U-Trol electronic load control.....Dec. 16 *154

Conveyors:
Ace Conveyor Industries oven conveyor Apr. 22 *134
Assembly conveyors increase food-mixer production. H. E. Linsley.....Dec. 2 *92
Barrel switch solves conveyor problem. F. W. Scooneas.....June 3 *108
Carrousel conveyor assembles and welds large dispenser drums.....Dec. 30 *80
Chain and belt conveyors handle die-cast products. B. C. Brosheer....June 17 *116
Cincinnati Cleaning & Finishing Machy. drum and belt conveyor.....Feb. 12 *154
Cleveland Crane & Engrg. carrier for chips.....Dec. 30 *134
Conveyors, chutes and hoists mechanize chip handling. R. C. Becherer Sept. 9 *120
Conveyor furnace anneals bimetal strips. C. F. Alban.....Sept. 23 *108
Horsepower for overhead chain conveyors. S. W. Jessop (Ref. Bk. Sheets) Dec. 30 *125
Hotpoint mechanizes range production. B. C. Brosheer.....Dec. 30 *67
Hyperbolic roller planed. James Van Voast.....July 15 *127
Island Equipment portable conveyor Jan. 1—132
Island Equipment Styl-O-Veyor booster Feb. 26—148
Link-Belt oscillating feeder and conveyor.....Aug. 26 *138
Mar-Rail steel belt conveyor....Dec. 16—150
Mechanizing cleaner manufacture ups output, saves floor space. A. F. Murray.....May 20 *110
Merry-go-round conveys radio-chassis assembly. Henry Gillig.....Oct. 7 *90
Prutton Machinery & Tool table conveyor belt.....Sept. 23 *156
Rapids-Standard belt conveyor..Feb. 26—144
Rapids-Standard portable power belt conveyor.....Apr. 22 *128
Sage Equipment floor conveyor..July 15—150
Sermat Conveyor Corp. Flex-E-Unit steel belt conveyors.....June 3 *148
Smith Power Transmission trolley conveyor.....Oct. 21 *160
Trucking eased with drag-chain conveyors. B. C. Brosheer.....July 29 *102

Coolants:
Arnold & Hoffman metal coolant..Dec. 2—146
Beacon Rust Proofing cutting oil Aug. 26—140
Frostrode Products coolant cooler... Dec. 30 *134
G.K.W. Oil Co. black satin oil..Nov. 18—174
Honan-Crane clarifier for coolants.. July 29 *130
Houghton cutting oil base....Mar. 25 *139
Liquid nitrogen simplifies bearing assembly. R. E. Bludeau.....Dec. 16 *82
Machinery Lubricants Silver chip coolant.....Feb. 12—166
Metal Clean Solvent Corp. cutting fluid.....Aug. 26—142
Cooperation on manufacturing facilities gains benefits. H. S. Wharen.....May 20 *94

Copper:
Carbides speed copper machining. C. R. Morgan.....Oct. 21 *102
Furnace-brazed assemblies replace one-piece units. H. M. Webber....Sept. 9 *92
How to finish copper and copper alloys. R. W. Belfit & others.....Feb. 26 *95
Machining copper and its alloys. J. J. McGuinness.....May 6 *101-112
Process sheet for copper plating. George Black (Ref. Bk. Sheets)....Sept. 9 *139
Standard commercial wrought coppers and copper-base alloys (table)..May 6—106
Typical uses of copper and copper alloys. J. J. McGuinness.....May 6—112

Corrosion:
Process sheet for chrome-pickle treatment. George Black (Ref. Bk. Sheets) Oct. 21 *141
Sinclair Refining rust preventive. Nov. 4—164
Chas. Stevens & Co. corrosion inhibitor June 17—168

Counters:
Durant Mfg. stroke and rotary counter attachments.....Oct. 7—156
Lansing Engrg. electronic instrument Mar. 11 *218
Potter Instrument photoelectric counter Nov. 18 *148
Superior Punch Press counter and stacker.....Dec. 16 *154
Counterbores—Plan-O-Mill Corp.....July 15 *150

Couplings:
American Flexible coupling....Feb. 26 *154
Computor simplifies alignment of couplings. Glenn Marek.....Dec. 2 *74
Roylyn automatic sealing couplings.... July 15 *156

Cranes:
Cardinal Corp. Hydro-Lift Crane.... Aug.26 *134
Day-Smith Hydraulic Crane unit.... Mar. 25 *146
Dravo Corp. air conditioning unit for crane cabs.....Dec. 30—148
Grand Specialties portable shop crane Dec. 30 *138
Ice tongs hoist heavy loads. G. R. Milner Dec. 16 *124
Jib cranes cut down sources of fatigue and injury. D. A. Johnson..July 29 *101
World's largest traveling crane at San Francisco Naval Shipyard....Jan. 29 *310
Yale & Towne Mfg. suspension scale for cranes.....Nov. 18 *158
Crankshafts—Wickes Bros. crankshaft turning machine uses carbides.....May 6 *146
Cream separators—skimmer disks produced faster by spinning. G. H. Cottrell Aug. 26 *78
Tapers for cream-separator valves turned by special lathes. K. R. McKay Aug. 26 *102

Cutters and Cutting Machines:
Acid machining.....Dec. 16—115
Air blast controls cooling, aids cutter run-out check. William Braun.... Aug. 26 *111
Air Reduction Sales torch for cutting stainless steel.....Apr. 8 *158
American Chain & Cable bar cutter June 17 *148
American Chain & Cable cutting machine July 29 *130
Approved Devices portable cut-off machine .....Oct. 21 *152
Bridgeport Safety Emery Wheel abrasive cutoff machine.....Aug. 12 *158
Carbide bit has four edges. Walter Dimitruk.....Dec. 16 *123
Careful storage reduces cutter costs. J. W. Jones.....Nov. 18 *115
Continental Machine pipe and tube cutter Jan. 1 *140
Cook Mfg. carbide tipped cutting tools Aug. 12 *164
Cook Mfg. carbide tipped tools Mar. 25—146
Dieheads will turn, from and groove. C. A. Reimschissel.....Oct. 7 *92
Eutectic Welding Alloys Corp. Cuttrode electrode.....Nov. 4—154
Fly-cutters are set progressively to distribute cutting load evenly. G. C. Allen.....Feb. 26 *117
Fox Grinders swing-frame cutoff machine.....Aug. 12 *156
Giddings & Lewis Machine Tool fly-cutter tools.....Apr. 22 *124
Glenbard Tool Mfrs. radial relief fixture for cutting tools.....Apr. 8 *150
Globe Tool & Engineering slot-insulator forming machine.....May 20 *138
Goose-neck cutter planes curved surfaces. G. R. Milner.....Nov. 18 *128
Grieder Machine Tool & Die cutoff machine.....Aug. 12 *155
How large gears are shaved. G. P. Maurer.....Dec. 16 *90
Maxwell recessing tools.....Aug. 12 *162
Methods for mounting cutters (Ref. Bk. Sheets).....Feb. 12 *147
Milling setup slips under spring to help cutter around die corner. D. Moore July 29 *109
National Broach & Machine Red Ring cutter.....Aug. 12 *155
Neoprene protective boots for cutters. J. W. Jones.....Nov. 18—116
Nord International Corp. Nibblex cutting tool.....Dec. 16 *142
Porter hand power cutters....Apr. 8 *150
Problems in shaving fine-pitch gears. L. D. Martin.....Dec. 16 *84
Side-cutting shaper tool clips wire lengths in gaging fixture. J. R. Paquin July 1 *116
Slotter forms thread-like cuts as crank positions job. C. D. MacKinnon May 6 *123
Tabor Mfg. cut-off machine.....Apr. 8 *152
Tool angles for machining Meehanite castings (Ref. Bk. Sheets)....Nov. 4 *139
Tool angles govern cutting efficiency. M. Kronenberg.....Jan. 15 *90

(*) Illustrated (ed) Editorial

Toolbit kits—Redhard Metals....Jan. 1 *132
Vertical surface-broaching fixtures. B. C. Brosheer, pt. 1 Jan. 1 *77, pt. 2 Jan 15 *101
Weddell Tools carbide cutter blades July 1—146
Weldon Tool shank-type angular cutters Nov. 18 *158
When a slower cut is faster....June 3—110

Cylinders:
Entwistle air cylinder.....Sept. 23 *164
General Motors Corp. Cavitometer.... Oct. 21 *148
Modernair Corp. air operation cylinders Nov. 18—174
Czechslovakia—Seeks metalworking leadership.....Mar. 11 *194
Skoda Works leads central Europe July 1 *124

D

Deburring:
Small cutters deburr blind edges. W. Smele.....Sept. 23 *134
Pines Engrg. varied type machine July 15 *150
Steel wool removes small burrs. George Ryder.....Oct. 7 *121
Decentralization—Criteria for decentralizing industrial organization.....July 29—107
Depreciation—Let's depreciate intelligently (ed).....Aug. 26— 71
Descaling with sodium hydride—process sheet. George Black (Ref. Bk. Sheets) Dec. 30 *127
Design—Dimensional instability affects design of precision equipment. F. C. Victory pt. 1 Feb. 26 *108, pt. 2 Mar. 11 *144, pt. 3 Mar. 25 *112, pt. 4 Apr. 8 *112
Dial thickness measured—Ames Co. Aug. 12 *166
Diamonds, Industrial—Triangle Equipment Sample-Marshall Diamond bonded tools.....Sept. 9 *158

Dies:
All American Tool & Mfg. die filer Aug. 26 *129
Better steel devised for hubbing. A. L. Franses.....July 29 *84
Boring mill fixture sets up die inserts for arc cut.....Dec. 2 *103
Broken die supported in block makes replacement unnecessary. Frederico Strasser.....Apr. 8 *126
Button holders solve "impossible" layout problem. Frederico Strasser Jan. 1 *103
Capped knockout takes die shock. Roger Isetts.....July 1 *115
Compound die cuts off, forms, curls. J. J. McGuinness.....May 20 *106
Connecticut Tool & Engrg. Williams die-making machine.....Mar. 25 *146
Curved chutes aid work ejection. H. S. Wharen.....Apr. 8 *88
DCMT Sales Corp. die casting machine Mar. 11 *212
DCMT Sales Corp. small die casting machine.....Aug. 12 *155
Dayton Rogers Mfg. die cushion..Nov. 4 *164
Dayton Rogers Mfg. die-cut name plates July 29—136
Draw-cut scrapers clean up dies, deburr holes and finish patterns. L. R. Fitzsimmons.....Mar. 2 *121
Ground screw cleans die holes. Roger Isetts.....May 20 *118
How Harvester makes forging dies. C. R. Hoagland.....Dec. 2 *78
Hydraulic Press cold chamber for die casting.....Oct. 7 *152
Jones & Lamson Machine carbide tipped die chasers.....Sept. 23 *158
Light Metal Machy. die-casting machine Aug. 26 *136
Mico Instrument pantograph for die castings.....June 17 *150
Modern Collet & Machine self-aligning die lifters.....Nov. 4 *152
Moore Special Tool die flipper..Dec. 30 *148
Milling setup slips under spring to help cutter around die corner. D. Moore July 29 *109
Pilots for progressive dies. J. R. Paquin (Ref. Bk. Sheets) pts. 1, 2 & 3.... May 20 *127
Precision dies draw brass lock parts. H. E. Nagle.....Dec. 30 *74
Precision dies mass-produce die-castings. H. E. Nagle.....Dec. 16 *77
Progressive die scores, trims and forms heavy shell. Theodore Oshinsly. Sept. 9 *85
Progressive die slashes tooling for fluorescent lamp sockets.....Apr. 8 *86
Punched cards used to control milling of dies in new process.....Dec. 16—128
Replaceable die handles small work. Hans Bormann.....Aug. 26 *112
Rice Pump & Machine die filing machine Nov. 18 *170
Rotating dies used in swaging. Anderson Ashburn.....Apr. 22 *77-84
Safer ways of using die sets. W. R. Jeffries.....Oct. 21 *103
Shop shots from Stewart die casting July 1 *108
Small punch draws deep shell. W. Z. Nesin.....June 3 *119
Smith & Sons Die Slick lubrication for die-casting machines.....May 6—156
Steel Products Engrg. Brehm trimming die.....Mar. 11—222
Templet-indicator setup planes brake dies from precut sample. P. E. Wasser July 1 *113
Dipping baskets—Automotive Rubber steel dipping baskets.....Sept. 9—175
Disks set layout angles. S. Framurz.... Dec. 2 *102
Skimmer disks produced faster by spinning. G. H. Cottrell.....Aug. 26 *78
Dispenser—American Dispenser Powdurn gadget.....Feb. 12 *162
Dowel pins—Holo-Krome Screw Corp. pins Aug. 26 *142
Dowel pins made on engine lathe with semi-automatic device. C. T. Bower July 15 *124
Drawer Units—Hamilton Mfg.....Mar. 11—208
Drawing—Precision dies draw brass lock parts. H. E. Nagle.....Dec. 30 *74

Drills and Drilling Machines:
Aluminum stock drives center for regrinding. H. M. Landauer....Aug. 12 *129
Arms hold irregular drill work. L. F. Stull.....Feb. 26 *119
Avey Drilling Machine.....June. 3 *150
Baker Bros. multi-operation machine July 15 *148
Bardons & Oliver boring and drilling machine .....Apr. 8 *147
Bearing housings drilled with rail fixture. L. C. Heinlein.....June 17 *114
Bertram Engrg. drilling attachment Dec. 2 *134
Brazing holds drill extension. D. M. Birrell .....Mar. 25 *119
Breaks cut by magnetizing drills. Elgani Stump.....June 17—127
Broken center drills. D. J. Pilarczyk Jan. 15 *122
Burg Tool Mfg. Burgmaster drilling and tapping machine.....May 6 *154
Canedy-Otto Mfg. Bantam radial drill Mar. 11 *208
Carbide drills. F. W. Lucht (Ref. Bk. Sheets) pts. 1, 2 & 3.....June 3 *133
Carbides speed copper machining. C. R. Morgan .....Oct. 21 *102
Chicago Latrobe Twist Drill Works carbide-tipped drills.....Apr. 22—128 Aug. 26—130
Clark Transfer-matic speeds truck-axle production. C. S. Ricker....Jan. 15 *94
Cleveland Republic Tool drill unit July 29 *142, Oct. 21 *156
Cleveland Twist Drill redesigned drill drifts .....Aug. 12 *168
Cloth patch with large drill improves holes in the stock. W. S. Mazer July 29 *111
Copper and its alloys drilled and reamed. J. J. McGuinness.....May 6 *102
Cross seven-station machine....Aug. 12 *166
Cummins Business Machines portable drill .....Apr. 22 *122
Double-acting screw on vise fixture centers forged links for drilling. C. T. Bower .....Nov. 4 *120
Drill ground with pilot works soft sheets. H. Scala.....Oct. 21 *128
Drill jig fits on V-block. Francis Spollen .....July 1 *115
Drill jigs speed output of stove burners. Walter Rudolph.....Feb. 12 *124
Drillpress grinds slitting saw. H. Scala May 20 *119
Drillpress made automatic by motor-driven attachment. J. F. Budnick May 6 *128
Drill-rod reamer finishes holes. D. E. Anderson .....Mar. 11 *184
Drill shank holds centerdrill for rapid tailstock assembly. A. B. Nixon Apr. 8 *126
Drill sleeve confines whipping. H. F. Spinks .....Oct. 21 *129
Drilling kinks cut machine downtime. C. S. Ricker.....Apr. 22 *94
Eclipse Counterbore core drill cutters Oct. 21 *150
Errington Mechanical Laboratory drillhead .....Nov. 18 *158
Federal Machine & Welder machine Jan. 1 *136
How to gun-drill for fine finish. James Harris .....Mar. 11 *136
Hydraulic units power machine elements. L. W. Court.....Aug. 12 *83
Industrial Clutch base for jig drilling Sept. 9 *148
Jig disks locate drills. S. Framurz Sept. 23 *131
Jig guides align small drill. H. Moore Sept. 23 *134
Jig locating pilot speeds work and reduces breakage of drills. F. L. Keller Apr. 22 *98
Keller Tool Airfeedrill units...Sept. 23 *162 Nov. 4 *146
Knurled rings hold drill job. R. B. Ware .....June 17 *129
Large panels drilled with press mounted on drill stand and plate. Harry Stern Mar. 25 *118
Le Maire Tool & Mfg. hydraulic feed drilling unit.....Nov. 18 *148
LeMaire Tool & Mfg. line process drilling machine.....Sept. 23 *156
LeMaire Tool & Mfg. special drill Oct. 7 *148
LeMaire Tool & Mfg. special machine Sept. 9 *160
LeMaire Tool & Mfg. two-way horizontal drill .....Nov. 18 *148
Locke Gage drilling and tapping power unit .....Mar. 11 *210
Manufacturer's Engrg. Service drill pig Apr. 8 *156
Methods of driving straight-shank drills. (Ref. Bk. Sheets).....Apr. 8 *145
Millholland Machinery indexing machine for drilling.....July 1 *136
Milwaukee Electric Tool Corp. Hole-Shooter electric drill.....Dec. 16 *156
Minute hole drilled in block by squeezing metals around wire. F. Webster June 3 *122
Moline Tool drilling machine....May 6 *146
National Automatic Tool driller and tapper .....May 20 *146
Multi-spindle driller.....July 29 *129
Natco machine.....Nov. 4 *142
Vertical machine for drilling, boring and tapping.....Nov. 18 *147
Way-type units.....Dec. 30 *140
National Tool Salvage carbide drill July 15—142
Old short twist drills make good counterbores. K. Stryker.....Jan. 1 *106
Plate shows feeds and speeds. D. P. Campbell .....Sept. 9 *127
Portable Electric Tools drill....Aug. 12 *158 Aug. 26 *138
Portable Electric Tools drill kit July 1 *136
Precise processing produces flatirons faster. L. J. Pantas.....Nov. 4 *98
Radials cut boring costs 24.3%..Dec. 18 *109
Saw-tooth jig aligns drill for machining out slots. H. Moore.....Sept. 9 *127
Scoreboard data.....June 3 *116
Severance Tool Industries drilling and reaming machine.....July 1 *134
Shaft-drilling V-block. Gosta Mattson Jan. 1 *106
Shaft positioned for drilling. H. Moore Feb. 12 *135
Simplex Tool & Engrg. drill and reamer Nov. 18 *150
Simplex Tool Engrg. drilling unit Dec. 16 *150
Simplex Tool Engrg. 4-way drilling machine .....Apr. 22 *132
Small, thin drill locates holes to critical layout tolerances. Harry Stern Feb. 26 *120
Snyder Tool & Engrg. center drilling Nov. 4 *146
Hydraulic feed machine.....Feb. 26 *150
Machine .....Jan. 15 *146
Special machine June 17 *152, Oct. 7 *146
Special purpose machine....Dec. 30 *134
Variable drilling machine....Sept. 9 *152
Stilts stretch radials to fit. B. C. Brosheer .....Aug. 12 *93
Strutz & Mead adjustable drillheads Nov. 4 *141
Stuart, F. L. portable electric English drill .....Nov. 4 *150
Super Tool carbide-tipped drills Jan 15 *152
Super Tool carbide-tipped twist drills Aug. 12 *156
Teletronics Laboratory Microdrill June 3 *146
Thriftmaster Products joint-drive drillhead .....Apr. 22 *126
V-block guides punch and drill for shaft layout machining. George Holman Apr. 22 *98
Whittle attachments for drill..Jan. 15 *158
Wolf & Co. electric drill.....Dec. 2 *128
Zagar Tool drilling machine....Mar. 11 *214
Zagar Tool gearless drillhead....Mar. 11 *220 Oct. 21 *160
Zagar Tool special purpose drill Nov. 18 *168

Drives:
Cinema Tool air drive for drilling, etc. June 3 *152
Eclipse Counterbore carbide drive Mar. 11 *214
Electric Machy. Mfg. magnetic drive units .....June 17 *148
Foote Bros. worm-gear drives..Oct. 7 *158
How Buick builds the Dynaflow. Chester Ricker .....Oct. 21 *91
Mines Safety Appliance power drive Jan. 15—146
Morse Chain silent-chain drives..July 15—156
Rockwell Mfg. hydraulic drive system Nov. 4 *156
Self-reversing clutch plate drives bench tapping spindle. W. A. Steenberger Sept. 23 *131

(*) Illustrated (ed) Editorial

Sterling. Electric Motors power drive Feb. 12 *164

Dust Collectors:
Aget-Detroit Dustkop.....Mar. 25 *142
July 1 *144
Aget-Detroit self-contained collector Nov. 18 *150
Industrial Electroplating Niehaus machine .....Nov. 18 *152
Carbide tool routs Fiberglas—dust protection .....Feb. 26 *83
Torit Mfg. No. 68 dust collector Apr. 22 *124

E

Economic Cooperation Administration—Capital equipment buying.....June 3—124

Ejection:
Curved chutes aid work ejection. H. S. Wharen .....Apr. 8 *88
Pin stop locates, ejects stock with spring-loaded mechanism. Chris Sorenson May 6 *215
Ram ejects plastic parts. Federico Strasser .....Dec. 2 *103
Ejectors—Super Tool rectangular ejector tool July 15 *144
Electric Irons—Precise processing produces flatirons faster. L. J. Pantas Nov. 4 *98
Electric Mixer—Assembly conveyors increase food-mixer production. H. E. Linsley Dec. 2 *92
Electric Ranges—Hotpoint mechanizes range production. D. C. Brosheer....Dec. 30 *67
Electrochemical lab opened.....Dec. 2—108
Electro-Motive Div. G. M. shop shots Apr. 22 *74

Electrodes:
Air Reduction Sales electrode..Oct. 21—152
Air Reduction Sales arc-welding electrode .....May 6 *141
All-State Welding Alloys mechinable cast iron electrode.....May 20 —136
Copper-alloy arc-welding electrodes. (Ref. Bk. Sheets).....Nov. 18 *141
Eutectic Welding Alloys Corp. Cuttrode electrode .....Nov. 4—154
General Electric arc-welding electrodes Nov. 4—150
Guard strengthens welder shunt. G. A. Ream .....Apr. 8 *124
Harnischfeger Corp. hard-surfacing electrodes .....Apr. 22—138
Hobart Bros. arc welding electrode Feb. 26—140
Hobart Bros. electrodes for arc welding Jan. 15 *154
Hobart Bros. electrodes for welding Dec. 16—164
Hobart Bros. Nickelcast electrode Nov. 18—162
Lincoln Electric Faceweld electrodes Nov. 4—150
Lincoln Electric Softweld electrode Nov. 18—154
Lincoln Electric Toolweld A & O Feb. 12—152
Lincoln Electric Tungweld C electrode Sept. 23—154
Metallizing Engrg. Ruf-Tred holder June 17 *147
McKay welding electrodes....July 29—132
North American Philips arc welding electrodes .....Dec. 2—128
Westinghouse Electric Corp.....Jan. 15—156
Westinghouse Electric Flexare electrodes for cast-iron welding.....May 6—154
Westinghouse stainless steel electrodes May 20—140
Wilson Welder & Metals arc welding electrode .....July 1—144
Electroformed parts may be your answer Nov. 18 *107
Electrolux Co.—Mechanizing cleaner manufacture ups output, saves floor space. A. F. Murray.....May 29 *110
Shop shots.....June 17 *96

Electronics:
Foxboro Dynalog electronic recorder Dec. 2 *138
General Electric electron diffraction instrument .....Feb. 12 *162
Lansing Engrg. Lectro-Count recorder Mar. 11 *218
Photoswitch, Inc. electronic timer June 3 *142

Electroplating
Process sheet for brush electroplating. George Black (Ref. Bk. Sheet) Aug. 12—149
Wagner Bros. zinc anode for use in electroplating .....May 6 *160

Elevators:
Automatic-cycle elevator for chip handling. R. E. Whinrey.....July 29 *106
Montgomery portable elevators..Dec. 2 *136
Moto-Flow Stair. Levayor.....Dec. 30 *144
Revolvator hand operated portable elevator .....Oct. 7 *148

Enamel—Printing replaces hand filling of embossed surfaces. H. O. Bates..Apr. 22 *89
Enamel—See also Coatings
Enameling—How to finish copper and copper alloys. R. W. Belfit & others..Feb. 26 *95
End Mills—Morse Twist Drill & Machine Mar. 11 *210
Engineers—Process engineer's place in industry. James Jones.....Jan. 1—160

Engines:
Airplane engine mounts tooled at a cost as small as possible. H. W. Wharen Mar. 11 *140
Cushman Motor Works single cylinder engine .....Dec. 2 *142
Engine-mounted hand turner trues up damaged crank pins. J. T. Zurlo June 17 *128
Equalizer—Caldwell Adjust-A-Leg equalizer Feb. 12 *134
Equipment—Review of metalworking equipment .....Jan 29 *127
Europe tools for extrusion. John Everhart Dec. 2 *67
Explosion of cartridge drives studs Jan. 15—146
Exports—Metalworking exports 1938, 1946, 1947 (tables).....Jan. 29—114
Expositions—Tool Engineers' Industrial Exposition at Cleveland.....Apr. 8 *127
Tool Engineers Industrial Exposition, Cleveland, 1948.....Mar. 11 *127
Extrusion—Europe tools for extrusion. John Everhart .....Dec. 2 *67
Eyes are your most valuable machines. L. J. Mastache .....June 17 *107
Eye calisthenics necessary. H. S. Galus Jan. 1—107

F

Family status affects vocational adjustment. Stockford & Kunze.....Oct. 8 *85
Fasteners—Armstrong-Bray conveyor belt fasteners .....Oct. 21—170
Dzus Fastener Supersonic product Dec. 2—140

Feeds:
Allen dial feed tables.....Mar. 25 *140
Attached mechanism loads balls in predetermined lot numbers. Joe Manuiss Apr. 8 *122
Cut-away on stripper plate speeds hand feeding stock. A. F. Hird....May 20 *120
Electrical control units produced in progressive die equipped with hopper feed. Paul Bonness.....May 6 *96
Gordon Hall adjustable feed hoppers Apr. 8 *152
Lyon-Raymond sheet feeding tables Feb. 12—160
Magazine fixture feeds parts automatically into tapping position. G. E. Shopbell .....July 15 *127
Production Tool & Die Pond bar stock feeder .....Apr. 22 *114
Roller-grip pneumatic attachment feeds strip stock to punch press. S. H. Pearson .....July 29 *108
Sheffer Collet stock pusher feeder May 20 *140
Slotted strap adjusts feed stop both horizontally and vertically. Burnett Menkin .....Apr. 22 *100
Work loaders applied to machine tools. Rupert Le Grand.....Mar. 11 *149-172
Fiberglas routed by carbide tool....Feb. 28 *83

Files:
Air Speed Tool file and saw....Dec. 16 *158
All American Tool & Mfg. die filer Aug. 26 *129
DoAll Co. band-filing machine..Dec. 2 *126
Milwaukee Chaplet & Mfg. filing machine Feb. 26 *148
Nicholson File general purpose file July 29—140
Rice Pump & Machine die filer..Nov. 18 *170
Severance Tool Industries die machine files .....Sept. 9 *150
Severance Tool Industries hand files May 6 *154

Filters:
Aget-Detroit filter-cleaner unit..Dec. 30 *142
Honan-Crane coolant filter.....Feb. 12 *154
W. G. B. Oil Clarifier multiple purpose filter .....Dec. 30—148

Finishing:
Blast cleaning prepares surface for finishing. L. J. Wieschhaus....Sept. 9 *81
Cross special machine finishes parts Oct. 21 *152
How smooth is smooth? B. C. Brosheer pt. 1..Sept. 9 *97, pt. 2 Sept. 23 *111
How to finish copper and copper alloys. R. W. Belfit & others.....Feb. 26 *95
How to gun-drill for fine finish. James Harris .....Mar. 11 *136
Razor-blade tool finishes lead. C. R. Milner .....Nov. 4 *123
Sturgis Products finishing machine for deburring .....Apr. 8 *152

Finland
How carbide tools are handled in Finland. Hans Branders.....Aug. 12 *96

Fire Extinguishers:
American LaFrance Foamite extinguishers .....Sept. 9—173
Kidde dry powder extinguisher..Dec. 30 *144
Modern industrial safety equipment. Anderson Ashburn.....Oct. 7 *101-116
Fireman's tool forged. Herbert Chase July 15 *114
Flames clamped by means of straps and pad. F. W. Duce.....Oct. 7 *123
Flame Cutting—Faults to avoid in torch-cutting. (Ref. Bk. Sheets)..June 17 *145
Ohmstede Machine Works machine Aug. 26 *138
Floor Machines—Breuer Electric Mfg. Aug. 12 *156
Floor scraper—Ampco Metal self-sharpening scraper .....June 3—140
Foot mats—Flexi-Mat Corp. rubber foot mats .....Sept. 9—160
Ford Motor Co.—Automation handles production. Rupert Le Grand....Oct. 21 *107
Process control corrects faulty methods. C. S. Ricker; from interview with R. M. McCarroll.....June 3 *112
Radiator production line. C. S. Ricker July 1 *77

Forging:
Alloys for non-ferrous forgings. (Ref. Bk. Sheets).....Jan. 15—143
Aluminum casting and forging....July 1 *94
Fireman's tool forged. Herbert Chase July 15 *114
Furnaces on skids add forging flexibility Apr. 8 *92
"The guy with the figgering board" saves $50,000 .....Dec. 2— 69
How Harvester makes forging dies. C. R. Hoagland.....Dec. 2 *78
How Packard whips tough forging jobs. Daschke & Lawson.....July 29 *73
National Machy. Maxirolling forging technique .....July 29 *129
National Machy. Reduceroll for preforming forging blanks....Nov. 16 *150
Robot hydraulic press forges heavy-duty parts .....Sept. 23 *124

Forming:
Blanks for dovetail forming tools. (Ref. Bk. Sheets).....Dec. 2 *121
Cyril Bath cabinet-forming machine for making dish-washing machines Oct. 21 *162
Federal Machine & Welder....Dec. 2—123
Form-tool discussion. C. A. Johnson Dec. 30—116
Holders for dovetail forming tools. (Ref. Bk. Sheets).....Dec. 2 *119
Production Service form-tool blanks Sept. 9 *156
Two-part flat forming tool made and sharpened quicker. S. E. Hancock July 29 *108
Foundations—See Mountings
Freight Cars—See Railways
Freight rates increased.....Aug. 26—118
Friden Calculating Machine—shop shots Feb. 12 *98

Furnaces:
Ajax Electric Hultgren salt-bath furnace July 1—138
Bellevue Industrial Furnace....Dec. 16 *146
Combustion Control flame-failure protection .....July 15 *154
Conveyor furnace anneals bimetal strips. C. F. Alban.....Sept. 23 *108
Cooley Electric Mfg. electric box furnace Nov. 4 *154
Furnaces on skids add forging flexibility Apr. 8 *92
Hevi-Duty Electric Temperite furnace Apr. 8 *150
Holden liquid electrode furnace Dec. 30—131
Leeds & Northrup furnace for high tempering .....Mar. 25 *152
Tempering furnace.....Nov. 18 *160
Lindberg Engrg. gas furnace....July 15 *148
Hardening steel furnace....Nov. 18 *154
Laboratory furnace.....Jan. 15 *145
Lithium atmosphere forge furnace Dec. 16 *150
Pit-type furnace.....July 29 *140
Batch furnace.....Feb. 26 *150
Shop shots at Kalamazoo.....Aug. 26 *98
Sunbeam Corp. oven furnaces..Apr. 22 *118
Sunbeam Stewart high speed furnace Mar. 11 *230
Reverse-flow recirculating furnace Jan. 15 *158
Thermo Electric Mfg. Temco furnaces Nov. 4 *148
Westinghouse Electric gas-fired furnace May 6 *152

(*) Illustrated (ed) Editorial

G

Gages and Gaging:
Accuracy in indicating shaft improved with thin steel leaf. H. Yarrow Aug. 28 *108
Ames Co. dial thickness measures Mar. 11—212; July 15 *150
Ammeter load gage indicates condition of tool. C. A. Phillips.....Dec. 18 *121
Angle ground on 6-in scale forms tool for gaging slots. W. A. Adams June 17 *127
Black Industries tension unit for web processing unit.....Dec. 30 *140
Block bottom surface ground for inspecting tapered parts. J. H. Coyle Aug. 12 *126
Block gage centers jig borer over work edge to locate holes. Chris Sorenson Apr. 8 *124
Branson Instruments thickness detector Dec. 16 *160
Cadillac Gage Pla-Chek gage..Nov. 4 *148
Caliper made into sheave gage. C. A. Yard .....Oct. 7 *121
Cavalier Gage 16-dial snap gages Apr. 22 *122
Cleveland Republic Tool Indexmaster inspector .....Feb. 26 *150
Corundum dial indicator gage....June 3—158
Cup wheel surfaces snap gage by getting inside deep throat. Ed Babin Apr. 8 *123
Decimal equivalents of various gages. (Ref. Bk. Sheets).....Mar. 25—133
Deep holes measured with replaceable rods. Edward Diskavich.....Apr. 8 *123
Double spindle strengthens gage for use with large layout work. C. H. Marsteller .....Apr. 8 *125
du Mont Corp. Minute Man gage base May 6 *154
Eastman Kodak Conju-Gage gear checker .....Dec. 30 *131
Elgin National Watch metal-tipped sapphire gages.....May 20 *136
Elgin National Watch Tipt-Type sapphire gage.....July 29 *140
Extended telescopic gage handles large dimensions and diameters. Henry Rasmussen .....Mar. 11 *186
Federal Products Corp. recording gage Aug. 12 *166
Gage-block assemblies form snap and limit-snap gages precisely. S. Framurz Mar. 25 *117
Gage finds center of bar stock. Hans Schmidbauer .....Apr. 22 *95
Gage-zone system harmonizes delivery and acceptance inspection. John Gaillard .....Feb. 12 *100
Griswold Mfg. Scan-a-scale measure device .....Dec. 16 *144
How smooth is smooth? B. C. Brosheer. pt. 1 Sept. 9 *97, pt. 2 Sept. 23 *111
How to treat a gage. Prof W. A. MacCrehan, Jr.....Dec. 16 *116
Indicator attachment sets rough and finish diameters. T. H. Hanley Jan. 15 *120
Inside threads gage-checked with thread-chasing fixture. N. J. Elby....May 6 *126
Inspect parts speedily with gages like these. F. Hartley.....Jan. 15 *121
Internal recess cut in cylinder checked by use of flush-pin gage. Glen Shopell May 20 *117
Koehler & Sons ball-gaging machine Nov. 18 *154
Light gage checks recess. J. T. Holmquist .....Dec. 30 *116
Moore Products comparator gage Mar. 11 *212
Nilsson Gage Nilco dial bore gage June 17 *147
Nilsson Gage Nilco snap gage..Mar. 11 *212
Penjaska Tool form and hole gage June 3—142
Penn Industrial Instrument pressure gages .....Dec. 16—160
Penn Industrial Instrument temperature recorder .....Dec. 16—160
Pin gage aids tube measurement by holding dimension for check. M. H. Ball .....Apr. 8 *125
Pivoting indicator tool checks vertical angles. Harry Smith.....Oct. 21 *129
Plug gage and gage blocks measure center-to-center. D. F. Hess.....July 1 *113
Pratt & Whitney multiple station piston gage.....Mar. 11 *218
Rocker arm actuates bore checker. J. M. Clark.....Nov. 4 *121
Roper & Broderick universal gage Aug. 26 *138
Scherr gage used for check of gears Oct. 21 *178
Scherr gear gage.....Feb. 12 *162
Sheffield Corp. camshaft precisionaire Dec. 30 *152
Sheffield Corp. gaging machine Mar. 25 *144
Snap-gages shop-produced with hard, dowel-pin anvils. Allan Clarke July 15 *125
Squaring gage indicates incline from vertical with dial readings. D. P. Campbell .....Mar. 25 *121
Standard Gage DuBo plug gage..Dec. 30—136
Starrett watch size indicator gage Sept. 23 *134
Stebar Magna Eye used on vernier scales .....Nov. 18 *156
Stevens-Arnold micrometer for gaging June 3 *144
Swedish Gage Ridermikrokator gage Aug. 12 *160
Taft-Peirce Mfg. machine table protractor ..... Jan. 1 *134
Thompson Products measuring gage Apr. 22 *126
Thread measurements. C. A. Johnson Dec. 2 *106
Threadwell Tap & Die fixed gages June 17—156
Turner Bros. plug gages.....Oct. 7 *146
U. S. Rubber hardness measuring gage Feb. 12 *160
Universal Engraving & Colorplate Pant-O-Jector gage.....Mar. 25 *140
Van Dyke Instruments direct-reading dial .....Dec. 30 *148
Veteran Machine Works Center Master gage .....Feb. 26 *148
Wheel fixture gages taper. H. Moore Dec. 16 *120
Wheelco Instruments solder tin-content indicator .....Oct. 21 *154
Gas-burner—Surface Combustion Corp. oil standby equipment.....Jan. 1—129
Gaskets—General Electric rubber-coated glass cloth for gaskets.....Aug. 12—170

Gears and Gearing:
Clutch plate matched to gear in 3-pinion assembly fixture.....May 20 *116
Cogmatic flame machining process for gears .....Dec. 16 *156
Comparator chart layout checks involute gears. F. E. Browning.....May 20 *89
Cosa Corp. Reishauer gear grinder Dec. 30 *142
Difference in tool point widths for work job on mill and lathe. E. J. Rantsch Mar. 11 *186
Eastman Kodak Conju-Gage gear checker Dec. 30 *131
Gear housing bored on angle-plate setup Dec. 2 *101
Gear measurement over non-standard pins. E. J. Rantsch. (Ref. Bk. Sheets) Jan. 29 *301
Gear measurement over non-standard pins—discussion. L. D. Martin, R. A. Miner, R. Parkes.....June 3—109
How gear shaving works. Sidney Cornell June 3 *94
How large gears are shaved. G. P. Maurer .....Dec. 16 *90
How to prevent gear-grinding troubles. L. P. Tarasov.....pt. 1 Sept. 9 *116
pt. 2 Sept. 23 *104
Idler-gear location—discussion. C. Dunlap .....Aug. 12 *127
Link-Belt variable-speed changer gear Apr. 8 *182
Mathematical formula locates idler in offset gear-pinion mechanism. H. L. Ahner .....June 17 *126
Michigan Tool loading device for gears Nov. 18 *150
Michigan Tool Shear-Speed gear shaper Oct. 7 *150
Michigan Tool Sine-Line gear check Dec. 16 *148
National Broach & Machine cutter for gear shaving.....Aug. 12 *155
National Broach & Machine gear and camshaft checker.....Sept. 9 *150
Gear checker..Mar. 11 *214; Nov. 4 *154
Gear checking head.....Nov. 4 *144
Gear-shaving machines.....Sept. 9 *154
Red Ring Diagonal gear shaving machines .....July 29 *132
Red Ring gear-shaving machine May 6 *148
Problems in shaving fine-pitch gears. L. D. Martin.....Dec. 16 *84
Quick method of calculating gear changes not listed on gearbox plate. M. F. Hoag .....Feb. 12 *131
Scherr Parkinson gear tester....Jan. 1 *136
Dec. 2 *126
Stock allowance for gear finishing. C. R. Staub. (Ref. Bk. Sheets)....Sept. 23 *145
Subtractive-lead hobbing or prime number spur teeth. J. W. Bergman July 15—117
Transmission gear-shift housing produced faster on automatic transfer machine Aug. 12 *122
Urbauer Engrg. measuring and checking gear system.....Apr. 8 *154
Waldes Kohinoor Bowed E-Ring for accurate positioning of gears..Oct. 21 *176
Work loader applied to machine tools. Rupert Le Grand.....Mar. 11 *153
Worm-turning tool positioned by adjustable toolholder. Albert Nivers Sept. 23 *133
Worn gears gashed and hobbed on large gap-type engine lathe. Neil MacLeod Feb. 12 *132
General Iron Works, a cooperative manufacturing pool. H. S. Wharen....May 20 *94

Generators:
Bogue Electric Mfg. motor generators Aug. 12 *170
Hertner Elec. motor generator charger Dec. 16 *152
High-Frequency Heating generator for induction heating.....July 1 *140
Motor Generator Corp. sets.....Oct. 7 *156
Westinghouse Electric.....Feb. 26 *150
Westinghouse Electric Rf generator for induction heating.....Mar. 11 *228
Germany—Shipment of iron and steel scrap "next to impossible".....Mar. 25—123
Giddings & Lewis Machine Tool—methods of work clamping. (Ref. Bk. Sheets) Apr. 22 *107

Goggles:
American Optical safety goggle Jan. 15 *154
Sept. 9 *150
Chicago Eye Shield Cesco Spec-Lite June 17 *154
du Pont de Nemours treated cloth for glass .....Apr. 22—113
Eye-protective equipment.....Oct. 7 *108
Univis Lens Safe-T-Vis goggles June 3—144
Great Britain—Machine tool show..Sept. 23 *135
Motor transport exhibit.....Nov. 18—137

Grinders and Grinding Machines:
Adjustable grinding segments maintain constant diameter. G. R. Milner Dec. 2 *102
Adjustable steadyrest eliminates taper in cylindrical-ground work. A. B. Nixon Mar. 11 *187
Armature shaft is form-ground on three diameters .....Nov. 4 *118
Auxiliary nose prevents damage to spindle of surface grinder. H. W. Cutting Oct. 7 *124
Ball setup laps center. F. T. Cullitan Dec. 2 *103
Bearing steadies drill grinding. T. Yates Mar. 11 *185
Besly spindle grinder.....Jan. 15 *154
Black & Decker Mfg. universal valve and tool grinder.....Sept. 9 *152
Blanchard Machine surface grinder Dec. 30 *132
Brown & Sharpe Mfg. grinders with 10-in swing.....Apr. 22 *156
Brown & Sharpe Mfg. cutter-grinder Jan. 1 *129
Brown & Sharpe universal grinding machine redesigned.....May 6 *144
Bryant Chucking Grinder.....May 20 *140
Buckeye Tools Corp. Stream-Power tools July 15 *152
Carlson Bros. cutter grinder....Dec. 16 *156
Cincinnati Grinders, Inc. Filmatic machine .....Jan. 1 *132
Cincinnati Milling Machine tool grinder May 6 *141
Cincinnati Milling & Grinding Machines roll-grinding machine.....Dec. 30 *146
Clipper Diamond Tool dressing tool June 17—158
Concentricity to a tenth. David Olson July 15 *123
Contour grinding work fed by bar and car. H. R. Ball.....May 6 *123
Converted grinder forms arcs to finish bearing cap surface. George Werner May 20 *117
Cosa Corp. Reishauer gear grinder Dec. 30 *142
Covel Mfg. surface grinder....Jan. 1 *142
Crown Industrial Products grinding wheel dressers.....Sept. 9 *164
Cup wheel surfaces snap gages by getting inside deep throat. Ed Babin..Apr. 8 *123
Curtis Machine Straight-O-Matic grinder and polisher.....Dec. 16 *150
Cutter grinder works better with tooth rest attached to hold cutter. D. L. Mather .....July 15 *128
Detroit Reamer & Tool grinding attachment .....Mar. 11 *206
Diamonds & Tools diamond dressing tools .....Sept. 23 *154
Dowel aids square grinding. Howard De Heer.....Jan. 1 *108
Draft angle ground on cutter for milling out casting dies. J. P. Harrington July 29 *112
Drill press grinds flat surface. Harry Stern .....Mar. 11 *18
Drillpress setup grinds radii on cutting tools and toolbits. Harry Stern May 6 *127
EZ Mfg. drill grinder.....Sept. 9 *148
Fish-Schurman Steelset diamond dresser Dec. 16—158
Fixture regulates wheel dresser for accurate radius and arc cuts. A. B. Nixon .....Apr. 22 *96
Frostrode Products coolant cooler for grinders .....Dec. 30 *134
Gallmeyer & Livingston CWA grinder June 3 *139
T drill grinders.....Sept. 23 *154
Tap and drill grinders.....Aug. 26 *136
Tap grinder.....June 17 *154
Grinder mounted on shaper ram sharpens teeth of circular saw. J. T. Zurlo Mar. 11 *183

Grinder rotary table checked by grinding of two thin bars. S. Framurz Feb. 12 *133
Hammond Machy. Builders....Mar. 11 *216
Abrasive belt grinder.....Mar. 11 *214
Belt grinder and polisher.....Mar. 11 *214
Chip breaker grinder.....Mar. 11 *212
Grinder and dust collector.....Mar. 11 *218
Hand tool and belt power grinding work on centers. Harold Gates....June 3 *118
Hanson holding fixture for jig grinding machines .....Feb. 26 *152
Hanson-Whitney Machine thread grinder July 15 *141
Heald Machine centerless grinder May 20 *136
Chuck-type grinder.....Sept. 9 *154
Internal grinder.....Mar. 25 *150
Model 271 .....Jan. 15 *148
Hisey-Wolf Machine grinder....Aug. 26 *138
Hisey-Wolf Machine redesigned grinders Dec. 30 *134
How to grind and lap carbide die parts—correction .....Mar. 25—115
Hydraulic control operates diamond grinder dresser.....Nov. 4 *118
K-E Industries diamond disk wheel Nov. 4 *152
Kindt-Collins Master disk grinder Aug. 26 *136
Koehler & Sons ball machine..Apr. 22 *118
Kruger Model pneumatic grinder May 20 *144
Landis Machine grinding fixture May 6 *150
Landis Tool multiple-wheel grinder May 20 *133
Leach Machinery surface grinder Jan. 15 *148
Matco Tool wheel dresser....Dec. 16 *154
Minnesota Mining & Mfg. heavy grinding wheel.....Nov. 18—164
Moore Special Tool jig grinders and borers .....Oct. 21 *154
Norton Norflex grinding wheel..May 20—138
Perfex Gage & Tool radius dresser Mar. 11 *220
Porter-Cable Machine disk grinder Dec. 2 *130
Porter-Cable Machine feed table for grinder .....Sept. 23 *160
Precision centering fixture sets up cylindrical grinds. A. B. Nixon..Dec. 16 *120
Precision taps flute-sharpened for close tolerances. Stanley Lovejoy..Mar. 11 *133
Production grinding Alnico rotors. R. E. Roberts.....Aug. 12 *94
Ring-and-clevis setup clamps chuck jaws for end grinding. M. H. Ball Sept. 23 *133
Rogers heavy duty grinder....Dec. 16 *154
Rotor Tool portable abrasive tools Dec. 2 *130
Rotor Tool vertical grinder....Mar. 11 *216
Royal Oak Tool & Machine chuck grinder Mar. 25 *160
Scheer Grinder high-speed off-hand grinder .....July 1 *140
Severance Tool Industries Micro-Mills finishing tools.....Aug. 26 *136
Sheffield Corp. crushing machine Apr. 22 *120
Sine bar dresses measured angles on outside grinding wheel edges. Philip Crain .....July 1 *114
Sleeve holds heated rollers snug against tapered mandrel. W. S. Ball Oct. 7 *122
Springfield Machine Tool vertical universal grinders.....Dec. 16 *148
Standard Electrical Tool heavy duty grinder .....Dec. 16 *156
Standard Electrical Tool snagging grinder .....Aug. 26 *134
Stanley Electric Tools bench grinder Sept. 9 *150
Stearns Magnetic Mfg. tilting frame for grinders .....Nov. 18 *147
Taft-Peirce Mfg. spline and gear grinder Jan. 1 *129
Taft-Peirce Mfg. surface grinder angle plate .....Mar. 11 *206
Torq Electric bench type grinder Dec. 2—123
Use classification for grinding wheels. (Ref. Bk. Sheets).....Jan. 29 *299
Valve-stem guides finish ground automatically. R. R. Coulette....June 17 *125
Versa-Mil machine tool attachment May 6 *142
Vulcan Tool Vulcanaire for jig grinding Aug. 26 *144
Wardwell Mfg. flute grinder..Mar. 11 *218
Wheels for grinding tools—broaches, cutters, reamers and taps. (Ref. Bk. Sheets) .....Jan. 29 *297
Wickes Bros. grinding wheel salvaging machine .....May 20 *146
Wickman Corp. chip-breaker wheel grinds grooves in carbide tools....Mar. 11 *210
Work laoders applied to machine tools. Rupert Le Grand.....Mar. 11 *153

Grinding:
Arbor sets up drill for grinding o.d. and shank. M. J. Curcio.....July 1 *112
Dressing attachment crush-forms to true grinding-wheel surface. C. T. Bower July 1 *112
Fixture checks form-tool grind. B. J. DeNeve .....Sept. 9 *128
How carbide tools are handled in Finland. Hans Branders.....Aug. 12 *96
How to prevent gear-grinding troubles. L. P, Tarasov.....pt. 1 Sept 9 *116 pt 2 Sept. 23 *104
Marine steam engines linkage arms ground with track and trolley positioner. W. A. Schlesinger.....July 15 *125

Grooving:
Clamping fixture holds bearing shell for oil-groove machining. R. R. Waech Oct. 7 *124
Diehead will turn, form and groove. C. A. Reimschissel.....Oct. 7 *92
Grooves cut in blind bore with a special lathe tool. Allen MacNeal....Feb. 12 *134
Key clamps grooving tool. R. H. Bergmann .....Oct. 21 *130
Rotary table grooves tube form. C. Taylor .....Nov. 18 *129

Guards
Pantographic press guard at Worcester Pressed Steel.....June 17 *92
Guillotine, electric, speeds salvage of aluminum from warplanes.....July 15 *129
Guns—American Brake Shoe Micro-Spray gun .....May 20 *142
Engineered Products combination blast gun .....Dec. 16 *148
Vande Mfg. metallizing gun..Feb. 12 *162

H

Hamilton Watch—how Hamilton hires. J. L. Owen.....Nov. 4 *85

Hammers:
Atlas Welding Accessories chipping hammer.....Jan. 15 *150
Borm Mfg. pneumatic toolholder hammer.....May 20 *148
Bryant Products Distributing stamping and forging hammer.....June 3 *140
Chambersburg Engrg. utility hammer Dec. 30 *132
Chicago Pneumatic Tool air chipping hammer.....Dec. 30 *144
Dril-Hamer Mfg. handtool.....Nov. 4 *141
High Speed Hammer automatic staking machine.....July 29 *134
Lea hammer makes useful tool. L. H. Hardcastle.....May 20 *118
Rotor Tool controlled hammer....Jan. 15 *146
Rotor Tool scaling hammer.....Sept. 9 *162
Starrett ball peen hammer.....Sept. 23 *151
Hangers for electrostatic painting. E. P. Miller, pts. 1 & 2 Aug. 12 *151, pts. 3 & 4 Sept. 23 *147
Hard facing improves tool life. Louis Barrett.....Apr. 8 *94
Hardness—Clark Instrument diamond penetrators for testers.....Sept. 23 *158
Clark Instrument hardness tester..Dec. 2 *128
Lepel High Frequency Laboratories units Nov. 18 *176
Head, dividing—should be kept in trim. Lew Suverkrop.....Aug. 12—124
Heading machines—Fundamentals of cold heading. H. E. Linsley....Apr. 8 *99-110

Heat Treatment:
Agnew Electric resistance-heating machine.....Dec. 2 *134
Bright hardening and tempering tiny parts. Hovis & Marks, pt. 1 Feb. 12 *91, pt. 2 Feb. 26 *112
Dempsey Industrial Furnace Corp. salt-bath unit.....Oct. 7—154
Dimensional instability affects design of precision equipment. F. C. Victory, pt. 1 Feb. 26 *108, pt. 2 Mar. 11 *144, pt. 3 Mar. 25 *112, pt. 4 Apr. 8 *112
General Electric 3-kw preheater..Dec. 16 *152
Heat-treating principles and their application to salt baths. Haig Solakian. pt. 1 Apr. 8 *96, pt. 2 Apr. 22 *90, pt. 3 May 6 *118
Painting cuts heat treatment scale. Rogers Isetts.....July 1—112
Radio Frequency Corp. brazing and soldering heater.....Nov. 4—152
Heaters—Electric heaters help accuracy of boring machine. R. T. Rudolphson July 15 *96
Wiegand Chromalox radiant heaters Sept. 23 *152
Hevimet alloy—General Electric....Jan. 15—160
Hobs and hobbing—subtractive-lead hobbing of prime number spur teeth. J. W. Bergman.....July 15—117

Hoists:
American Chain & Cable Whippet hoist Jan. 15 *150
Hydraulic hoist production increased by replacing hand welding with manual hidden arc welding. Al Blewett....July 1 *106
Keller Tool air motor hoist.....Mar. 25 *152
Lewis-Shepard Products hand operated hoist.....Sept. 23 *158
Special hoist reduces parts handling Nov. 4 *100
Yale & Towne Mfg. wire rope hoist Mar. 25 *142

Holes:
Elliptical holes cut on mill by fly cutter and angled setup. A. T. DeMello July 15 *124
Fixture locates blind holes. L. Kasper May 20 *120
Mathematical shortcut for computing new coordinates. D. E. Sweet....Feb. 26 *115
Rectangular hole formed in block using only common machine tools. Frederico Strasser.....Apr. 22 *97
Tool burrs small hidden holes. R. J. Chrosmiak.....Feb. 12 *129

Hones and Honing:
Align honing eliminates bearing scraping. H. E. Linsley.....Jan. 15 *88
Fulmer single spindle honing machine Oct. 7 *144
Micromatic Hone Corp. Microflat machines.....Sept. 9 *150
Micromatic Hone multiple-spindle micro-honing machine.....Apr. 22 *116
Staples Engineering honing machine June 17 *156
Work loaders applied to machine tools. Rupert Le Grand.....Mar. 11 *160
Hook rig transfers steel bars from furnaces to quenching bath.....May 20 *118
Hopper—Stackbin Corp. adjustable hopper June 17 *152
Hourglass shape tuned on lathe with the help of planer. Ralph Egolf.....Apr. 8 *122
Housings for transmission gear-shift produced faster on automatic transfer machine.....Aug. 12 *122
Hub diameters, minimum. B. F. Astley (Ref. Bk. Sheets).....Dec. 30 *129
Hubs produced on watchmaker's bench lathe. C. H. Willey.....June 3 *120

Hydraulic Equipment:
Air-powered devices checked hydraulically. Rupert Le Grand.....Mar. 25 *90
Electrol, Inc., control center for hydraulic system.....June 17 *162
Hydraulic Press Mfg. Cubline unit July 29 *144
Hydraulic Press Mfg. Ten-Ton-Tony midget unit.....Apr. 8 *162
Hydraulic units power machine elements. L. W. Court.....Aug. 12 *83
Jerome Hydraulics power unit...Feb. 26 *144

I

Indexing:
Azimuth plate rechecks dividing. F. E. Clarke.....Jan. 1 *104
Davis & Thompson multiple-operation machine.....July 29 *136
Hex-heads milled in three passes with indexing table. Robert Mawson..Jan. 1 *106
Master bases cut fixture costs. Herman Goldberg.....Dec. 2 *83-90
Millholland Machine indexer....Nov. 4 *141.
India—Metalworking industries demands modern methods and machinery....July 15 *130
Indium—Process sheet for indium plating. George Black (Ref. Bk. Sheets) May 6 *139

Induction Heating:
Ajax Electrothermic Corp. induction heater.....Apr. 8 *154
Eastern Industries cooling transfer unit Sept. 9 *156
High-Frequency Heating generator... July 1 *140
How to design work coils for induction heating. Griffiths & Skiba..Aug. 12 *99-110
Lepel High Frequency Laboratories hardening units.....Nov. 18 *176
Radio frequency generator handles brazing and hardening. Dr. R. A. Nielsen Nov. 18 *112
Westinghouse Electric Rf generator for induction heating.....Mar. 11 *228
Industry—Is metalwork moving?....Aug. 12 *111
Inserts, die, for arc cut performed on boring mill.....Dec. 2 *103
Inserts for chuck jaws. R. H. White. Sept. 23 *132

Inspection:
Cleveland Republic Tool Indexmaster inspector.....Feb. 26 *150
Gage-zone system harmonizes delivery and acceptance inspection. John Gaillard.....Feb. 12 *100
Practical inspection lowers scrap and rework. Jack Shafer.....Dec. 16 *112
Punchpress inspection chart (Ref. Bk. Sheets).....May 6—137
Sperry Products supersonic reflectoscope for inspecting welds.....July 1—136
Insulation tape—Hanson-Van Winkle-Munning.....Feb. 12—164

(*) Illustrated (ed) Editorial

Interferometer—Bausch & Lomb Optical Co. June 3 *146
International Harvester—shop shots..July 15 *121 July 29 *78
Iron—Shop tests for identifying cast irons (Ref. Bk. Sheets).....Nov. 18 *143
Isolating paste—Denfis Chemical Laboratories Dec. 30—156
Italy—Credits granted to concerns in Italy, Austria.....Feb. 26—126

J

Jacks—Lewis-Shepard Products JackStacker Mar. 25 *148
Job Evaluation—How to evaluate supervisory jobs. O. R. Winjum...Aug. 26 *81
Joints:
Capscrews form flexible joint for limited movement of links. E. K. Anderson Mar. 25 *119
Curtis universal joint has center-block heat reducer.....July 15 *154
Universal Air Line Joint Mfg...Dec. 30—154

K

Keystone Brass Works—fixtures aid work handling. Walter Rudolph....May 20 *96
Keyways:
Block helps to center cutter over shaft for keyway milling. Chris Sorenson Apr. 22 *97
Centering device locates keyways on tapered shafts. W. M. Halliday Jan. 15 *122
Datum plate locates keyways. J. K. Smith Oct. 21 *127
Lathe cuts keyways. C. E. Bliven Jan. 15 *123
Positioning blocks locates keyways. J. J. Kocinski .....Apr. 22 *96
Kits—Lapeer Mfg. kit for handicapped people Mar. 25—139
Kodak manufacture. H. E. Linsley..Oct. 21 *98

L

Labor:
Does a raise raise output? (ed)..Feb. 12—119
Eyes are your most valuable machines. L. J. Mastache.....June 17 *107
Handicapped vets handle jobs normally in production. Samuel Stanley.Sept. 9 *114
How family status affects vocational adjustment. Stockford & Kunze..Oct. 7 *85
How Hamilton hires. J. L. Owen.Nov. 4 *85
How to evaluate supervisory jobs. O. R. Winjum.....Aug. 26 *81
How to keep employees informed..Apr. 8—119
How to keep your employees informed. Burnham Finney.....Mar. 25 *99-106
Job security No. 1 factor affecting employee morale.....June 17—109
NTDMA against proposed change on overtime pay.....Jan. 1—115
Profit sharing can work in a free-enterprise system. C. A. Norgren..Mar. 25 *83
Quitting time or washup time? J. K. Matter.....Aug. 12—117
Suggestion system that works to everyone's advantage. Adolph Haass.Nov. 18 *114
Wages in metalworking industries 1941, 1946, 1947 (chart & table)...Jan. 29—118
Woodward Governor has some unusual company policies. I. C. Martin.June 17—119

Lapping and Lapping Machines:
American Gage & Machine centerless lapping machine.....Jan. 1 *138
Crane Packing Lapmaster.....Dec. 2 *124
Mic-Lap precision tool for lapping micrometers.....July 15 *152
Rotating drillpress table speeds lapping operation. Harold Greuel.....July 29 *109
Valve driver controls lapping. R. R. Waech.....June 17 *127

Lathes:
Airplane engine mounts tooled at a small cost. R. S. Wharen.....Mar. 11 *140
Aluminum stock drives center for regrinding. H. M. Landauer....Aug. 12 *129
American Steel Foundries Sebastian lathes.....Oct. 7 *142
American Tool Works cam-duplicating lathe.....Feb. 26 *140
Automatic lathe mechanism faces work with rough and finish cuts. R. R. Waech.....Aug. 12 *126
Baker Bros. two-way horizontal machine Apr. 8 *152
Ball-turning lathe attachment cuts hand feed, raises speed. Walter Milewski June 17 *129
Bar setup on planer locates trace used for turning hourglass shape. Ralph Egolf Apr. 8 *122
Bearings prevent stock marking in lathe steady-rest installation. W. E. Blackham.....Mar. 25 *121
Button holders solve "impossible" layout problems. Frederico Strasser....Jan. 1 *103
Center Scope Products precision locating on lathes.....June 17 *160
Center set equips standard lathe. Charles Homewood.....Nov. 4 *123
Chapin Auto-Truer lathe truing attachment.....July 15 *144
Cincinnati Lathe & Tool fixed-gap-bed lathes.....Dec. 30 *136
Cross Transfer-matic axle machine Jan. 1 *134
Crown Rheostat & Supply polishing lathe Jan. 15 *152
Duplicate punch and die taper cut by backhand boring system. Gustave Remacle.....July 1 *115
Four-way tool-holding turret cuts engine-lathe time for small lots. D. J. Mulholland.....July 1 *114
Giddings & Lewis Machine Tool.Apr. 22 *136
Grooves cut in blind bore with a special lathe tool. Allen MacNeal....Feb. 12 *134
Hanson-Van Winkle-Munning polishing lathe.....June 17 *160
Hardinge Bros. precision lathe..Feb. 26 *139
Headstock bearings to old lathe replaced in shell reaming setup. F. C. Lurz July 29 *111
Hydraulic units power machine elements. L. W. Court.....Aug. 12 *83
Indicator attachment sets rough and finish diameters. T. H. Hanley.Jan. 15 *120
Industrial Operations, Inc. Skoda lathe Jan. 15 *150
Inverted tools cut and groove replacement pistons.....Aug. 26 *100
Lathe dog grips threads. John Homewood.....June 17 *128
Lathe mount drives gas torch. Paul Redl Nov. 4 *123
Lathe spider supports cylinder while counterbore work is done. R. J. Lamp Apr. 8 *123
LeBlond Machine Tool — Regal lathes Dec. 2 *128
Lorber Export Import & Purchasing Pultra Micro lathes.....Nov. 18 *152
Manual "armbreaker" turning grooves tube-bending forms. F. J. Zarnowsku Sept. 9 *124
McKenzie Engrg. lathe toolholders Sept. 9 *160
Morey Machine automatic lathes finish railroad car axles.....Nov. 4 *148
National Acme single-spindle machine Oct. 21 *147
Offset boring head saves time when taper turning with lathe. J. W. Rundt Feb. 12 *129
Oil flow preserves lathe center..Sept. 9 *128
Openside toolholder allows closer facing and turning. Arthur Morton....Jan. 1 *104
Pines Engineering end machine..Jan. 1 *138
Pneumatic plunger in turret lathe replaces barfeed mechanism. D. E. Eaton Oct. 21 *128
Radius-cutting lathe tool mounted in toolpost. A. B. Nixon.....Nov. 4 *120
Rex Mfg. boring bar holder for lathes July 1 *136
Rise on cams is turned in lathe with templet-and-follower setup. Burl Manberger.....May 20 *119
Rockford Machine Tool Economy lathe Dec. 2 *136
Scale tool locates bolt circle. H. W. Cutting.....Nov. 18 *128
Schauer Machine variable speed-lathe Dec. 2 *124
Schauer Machine vertical spindle lathe Mar. 11 *216
Serrated, tapered shaft produced by tool held in lathe turret. G. R. Milner June 3 *118
Sheldon Machine bench lathe....June 3 *140
Sidney Machine Tool engine lathe Apr. 8 *148
Sidney Machine Tool cap lathe..Feb. 12 *154
Sidney Machine Tool universal lathe Oct. 7 *154
Small hubs cut off and drilled with watchmaker's bench lathe. C. H. Willey June 3 *120
Small Machines metal turning lathe Nov. 18 *147
Small Machines small lathe....Nov. 18 *147
Snyder Tool & Engrg. feed lathe.Apr. 8 *154
South Bend Lathe Works follower rest July 15 *142
Spacers back up turning work to support small, thin stock. A. B. Nixon.Apr. 22 *98
Spare compound, cross-slide convert lathe for milling work.....July 15 *126
Special lathes turn tapers. K. R. McKay Aug. 26 *102
Spherical-turning lathe cuts precision ball and socket elements. A. B. Nixon Jan. 15 *119
Spindle noses for lathes, pts. 1 & 2 (Ref. Bk. Sheets).....July 15 *137
Spindle stop engine lathe into production cutoff machine. A. B. Nixon..Feb. 26 *122
Spinning lathe doesn't stop—work loaded on tailstock. Rex May, Jr.....Dec. 2 *104
Split collet and beveled pins hold lathe work fore and aft. F. H. Scriber July 1 *115
Steadyrest controls cutoff on lathe with loose bearings. Nels Malmgren.Feb. 12 *129
Steam fitting turned accurately with ball-and-socket spacer bar. W. D. Stevens Sept. 9 *128
Steel balls as centers improve offset tailstock taper turning. A. F. Wyleta, Jr. Jan. 15 *120
Superior Mfg. lathe faceplate...Nov. 18 *168
Templet-and-follower fixture controls turning of spheroids. F. G. Fonquen Feb. 26 *119
Templet-and-follower setup improved. L. F. Cheek.....June 3 *120
Templet-indicator setup planes brake dies from precut sample. P. E. Wasser July 1 *115
Toolslide set at angle makes accurate turning and boring. E. R. Vernon June 3 *118
Turning and boring copper and its alloys. J. J. McGuinness.....May 6 *102
Turning precision steel housings..Dec. 2 *100
Turret hookup reduces load on small threading dichead. R. E. Mills.Aug. 12 *130
Turret lathe attachment produces cams with roller and tool holder. W. Lewis Aug. 12 *129
Walker Hydraulic Duplicator attachment for various machines.....Dec. 16 *148
Work loaders applied to machine tools. Rupert Le Grand.....Mar. 11 *160
Worn gears gashed and hobbed on large gap-type engine lathe. Neil MacLeod Feb. 12 *132
Layout angles set by disks. S. Framurz Dec. 2 *102
Levellers—Hydropress plate stretcher leveller Dec. 30 *136
Levels—Engis Equipment precision levels for planes.....June 17 *160

Lights and Lighting:
American Electronics indicator-light subassembly.....Aug. 12 *168
Eyes are your most valuable machines. L. J. Mastache.....June 17 *107
Fluorescent lamp sockets—progressive die slashes tooling.....Apr. 8 *86
Kirkland QI indicating lamp..Aug. 12 *166
Light shows follower contact. Earl Goodman.....Jan. 1 *107
Square D oil-tight pilot light....June 3 *154
Test your own fluorescents. Keiffer & Amick.....July 29 *80
Yellow light reduces glare. F. E. McLane.....Aug. 12—127
Lignum-vitae—how to handle. H. E. Linsley June 17 *122
Lineshaft calculations chart. T. G. Hicks (Ref. Bk. Sheets).....Nov. 4 *137
Loaders—Work loaders applied to machine tools. Rupert Le Grand....Mar. 11 *149-172
Lockheed Aircraft Corp.—How to evaluate supervsiory jobs. O. R. Winjum Aug. 26 *81
Locks—Precision dies draw brass lock parts. H. E. Nagle.....Dec. 30 *74
Precision dies mass-produce die-castings. H. E. Nagle.....Dec. 16 *77
Locomotives—Diesel locomotives assembled at Electro-Motive, G. M.....Aug. 22 *74
Flue tubes cleaned automatically. L. W. Sagle.....May 20 *102
Lord Mfg. shop shots. Walter Rudolph Mar. 25 *96

Lubrication:
Acheson Colloids lubricant for dies and presses.....Apr. 8—162
Alpha Corp. Molykote lubricating powder.....Oct. 7—144
Bijur Lubricating Corp. lubricator May 6 *156
Coolant pipe guide. Donald Campbell Feb. 12 *133
Freedom-Valvoline Oil Valvoline lubricant.....Oct. 21—174
General Electric silicone-oil release agent.....Aug. 12—168
Graymills Corp. oiling unit for presses July 29 *144
How colloidal graphite aids metal forming. G. Giles (Ref. Bk. Sheets) June 17—143
Jarrett Compressor & Equipment Lubri-Filter.....June 17 *162
Johnson & Son lubricating wax..Sept. 9—170
Keystone gun method of application of heavy lubricant.....Nov. 18 *170
Magnet stand holds oil supply to cool jobs on small machines. D. P. Campbell.....Aug. 12 *127
Moisture in cutting oil bad for carbide tools.....Jan. 15—100

(*) Illustrated (ed) Editorial

Oil-Rite multiple-sight type oilers Dec. 2 *138
Planned lubrication cuts maintenance costs. C. H. Parks....Oct. 21 *104
Shell Oil drill and saw blade lubricant May 6 *158
Trico Fuse Mfg. thermal oiler. Oct. 21 *172
Webb grease seals for bearings..Nov. 4 *156
What to look for in hydraulic oils. A. J. Zino, Jr., pt. 5 Jan. 1 *96, pt. 6 Jan. 15 *97, pt. 7 Feb. 12 *126
Lubrication—see also Coolants

M

Machinery:
Machine tool in Great Britain..Sept. 23 *135
Machine tool industry holds sales course —symposium....Aug. 12 *135
Review of metalworking equipment Jan. 29 *127
Survey of machine tool buyers. H. L. Tigges....Aug. 12—140
Machinery and Allied Products Institute—Conference....Dec. 30—120
Meeting....July 1—118

Magnesium:
1-oz. binocular shell machined to close tolerances. Anderson Ashburn..July 15 *89
Process sheet for dichromate treatment of magnesium. George Black (Ref. Bk. Sheets)....May 6 *135
Zinc film permits plating on magnesium. H. K. DeLong....May 6 *98
Magnesium Assn. meeting....Apr. 8—130
Magnetic Equipment—Ace Typewriter Service Duo-Mag tool....Apr. 22 *113
Cutler-Hammer lifting magnets..Sept. 9 *148
Magnifier—Safety Center Supersite. June 17 *154
Maintenance—Shop carts carry all the tools. A. B. McCrea....June 17 *110

Management:
Are you in Sleepy Hollow? E. J. Tangerman....Jan. 15 *85
Employees run safety program. Victor Gruendler....Dec. 30 *78
How to evaluate supervisory jobs. O. R. Winjum....Aug. 26 *81
How to keep your employees informed. Burnham Finney....Mar. 25 *99-106
The personnel element (ed).....July 1— 75
Trying a new idea (ed).....July 15— 87
Woodward Governor has some unusual policies. I. C. Martin....June 17 *119
Mandrels—Erickson Tool air-operated mandrel....Feb. 26 *152
Erickson Tools expanding mandrel Mar. 11 *226
Manufacturing—Is statistical quality control of value in manufacturing? No and yes. B. D. Miller, C. W. Kennedy Sept. 9— 86
Market research will help small company. M. G. Jenkins....Aug. 26—104
Marine steam engines linkage arms ground with track and trolley positioner. W. A. Schlesinger....July 15 *125

Markers and Marking:
Acme Marking Equipment roll-type marking holders....Sept. 23 *162
Acme Marking Equipment stamp holder July 29 *138
Acromark pressure marking machine Mar. 25 *150
Cunningham marking holder....Apr. 22—122
New Method Steel Stamps, Inc..Apr. 22 *120
Noble & Westbrook graduating and marking machine....Apr. 22 *130
Western Lithograph E-Z code wire markers....Aug. 12 *158
Materials—Where materials are going 1946, 1947 (chart & table).....Jan. 29—117

Materials Handling:
Automobile wheel manufacture related to plant layout and materials handling methods. H. S. Wharen.....Feb. 26 *84
Carrousel conveyor assembles and welds large dispenser drums.....Dec. 30 *80
Conveyors, chutes and hoists mechanize chip handling. R. C. Becherer..Sept. 9 *120
Ford handles by automation. Rupert Le Grand....Oct. 21 *107-122
Handlnig spells economy at power saws. Benjamin Melnitsky.....Jan. 1 *74
Hotpoint mechanizes range production. B. C. Brosheer....Dec. 30 *67
How materials handling affects plant layout. H. J. Rowan.....Dec. 30 *83-98
Jib cranes cut down sources of fatigue and injury. D. A. Johnson..July 29 *101
Launderall washing machines output increased by improved materials handling. B. V. Eastman.....June 17 *104
Locomotive flue tubes cleaned automatically. L. W. Sagle.....May 20 *102
Materials Handling Exposition highlights Feb. 12 *139
Mechanical muscles are better (ed) Dec. 30— 65
Mechanizing cleaner manufacture ups output, saves floor space. A. F. Murray....May 20 *110
Motorized wheelbarrows roll through straight-line layout. Arthur Hess Nov. 18 *118
National Materials Handling Exposition Jan. 29 *303
Notched bins handle crankshaft. Apr. 22 *93
Novel materials handling methods devised at Keystone Brass Works. Walter Rudolph....May 20 *96
Trolley coach assembled utilizing aircraft fixtures. S. C. Klein..Sept. 9 *88
Trucking eased with drag-chain conveyors. B. C. Brosheer....July 29 *102
Work-handling devices simplify motor manufacture....June 3 *88
Materials handling—see also Conveyors, Cranes, Skids, Trucks
Materials Handling Exposition exhibitors Dec. 30—111
Materials Handling Exposition in print Dec. 30 *100
Mathematical shortcut for computing new coordinates. D. E. Sweet....Feb. 26 *115
McGraw, James H., dies; founder of McGraw-Hill Publishing Co....Mar. 11 *193

Measurement:
Edge-to-edge measuring method gives center distance of holes. Hans Schmidbauer....Mar. 11 *184
How smooth is smooth? B. C. Brosheer, pt. 1 Sept. 9 *97, pt. 2 Sept. 23 111
Photocon Research Product Metroscope Sept. 9 *146
Metal Spraying—Hard facing improves tool life. Louis Barrett....Apr. 8 *94
Metal stitchers—Acme Steel Acme-Morrison machine....Mar. 11 *208
Metallizing failures to avoid. J. E. Wakefield....Sept. 23 *100
Metallizing Gun—Metallizing Engineering Co....Apr. 22 *130
Metalock process repairs cracks in presses. J. W. Hillhouse....Aug. 26 *73
Metals—Kennametal material of cement-carbide composition....Jan. 1—144
Wear resistance measured in laboratory and shop. Prof. Dr. Ing. N. N. Sawin May 20 *98

Metal Working (in general):
American Machinist index of metalworking production 1935-1947 (chart) Jan. 29—121
Appraisal of metalworking (charts & tables)....Jan. 29 *105
Capital expenditures (charts)..Jan. 29—109
1948 to be metalworking's biggest peacetime year (charts)....Jan. 29—107
Gaging metalworking. Feb. 12—86, Feb. 26—74, Mar. 11—122, Mar. 25—78, Apr. 8—78, Apr. 22—64, May 6—88, May 20—78, June 3—78, June 17—86, July 1—72, July 15—84, July 29—68, Aug. 12—78, Aug. 26—68, Sept. 9—76, Sept. 23—90, Oct. 7—80, Oct. 21—86, Nov. 4—80, Nov. 18—86, Dec. 2—62, Dec. 16—72, Dec. 30— 62
Is metalworking moving?.....Aug. 12 *111
Prices (table).....Jan. 29—120
Shipments (charts & tables)....Jan. 29 *112
Statistical appraisal.....Jan. 29 *105
Steel shipments (table).....Jan. 29—116
Wages (chart & table).....Jan. 29—118
Where materials are going (chart & table).....Jan. 29—117
Microfilming camera—Diebold, Inc.—films tracings while in motion.....Nov. 4 *148

Micrometers:
Electro Products Laboratories....Oct. 7 *150
Lufkin Rule adjustable parallels for micrometers....June 17—156
Makeshift micrometer for large work built from snap gage. George Werner Apr. 8 *123
Perfex Gage & Tool radius dresser Mar. 11 *220
Richards Machine Tool duplex micrometer....May 6 *148
Richards Machine Tool Rimat Microdapter....Oct. 7 *141
Springfield Machine Tool micrometer cross-feed dial....Aug. 12 *170
Standard screw threads can be measured with micrometer and adapter. Charles Shope....Oct. 22 *126
Starrett block frame micrometers Sept. 9 *166
Starrett tubular micrometers..Aug. 26 *130
Stevens-Arnold gage micrometer. June 3 *144
Van Keuren light wave machine. Apr. 22 *134
Wall of small tubing gaged with micrometer attachment. James Cuyler June 3 *120

Microscopes:
Boeckeler Instrument toolmakers microscope....Dec. 2 *134
Gaertner Scientific Corp. spotting attachment....July 1 *134
Leitz Sagem toolroom microscope. Feb. 26 *146
George Scherr Wilder toolmakers microscope....July 1 *142
Mill locaitons by states.....July 29—113

Milling and Milling Machines:
Aber Engrg. Works carbide-tipped milling cutter....Apr. 8 *154
Air motors operate scroll chucks on milling fixtures. L. E. Heinlein..Aug. 26 *77
American Electric Fusion milling machine....Jan. 15 *148
Auto Engraver milling machine attachment....May 6 *146
Bemis & Call milling attachment. May 20 *148
Brown & Sharpe Mfg. power-feed machine....Mar. 25 *148
Brown & Sharpe universal millers Sept. 9 *145
Browne & Sharpe Mfg. varied type end mills....July 15 *141
Cadillac Cutter double end mills Apr.8 *147
Chicago Tool & Engrg. milling attachment....Feb. 12 *158
Cincinnati Gilbert Machine Tool machine for punch press frames. July 29 *136
Cincinnati Milling Machine dial type machine....July 15 *146
Cosa Corp. milling and boring machine Mar. 11 *205
Cost-cutting milling setups. A. F. Clark Nov. 4— 94
Coulter Machine thread milling machine Dec. 2 *123
Cross thread milling machine..Apr. 8 *148
Diamond-Detroit milling cutter.... Aug. 12 *162
Difference in tool point widths for worm job on mill and lathe. E. J. Rantsch....Mar. 11 *186
Different tool-point widths for milling worm. C. A. Johnson.....May 20 *117
Drillpress heads bored in miller with fly cutter and shell reamer. G. C. Russell....Aug. 26 *108
Elliptical holes cut on mill by fly cutter and angled setup. A. T. DeMello July 15 *124
Erickson Tools indexing fixture for milling....Apr. 8 *158
Erwood milling machine and drillpress vise....Sept. 9 *166
Finish boring on horizontal mill, Logansport Machine.....June 3 *117
Free ring controls depth of hand-miller chamfer....Dec. 2 *101
Gairing Tool E-Con-O-Mill blade.. Jan. 1 *140
Gairing Tool E-Con-O-Mill line of mills....Dec. 30—142
Geared disk-cam holder matches feed and rotation for milling. C. T. Bower July 29 *110
Gorton Machine 0-16A machine Feb. 12 *151
Hex-heads milled in three passes with indexing table. Robert Mawson Jan. 1 *106
Home made in one-man shop a milling machine....Apr. 22 *72
Howald Machine Works carbide end mills....Sept. 23 *152
Hutchinson vertical milling attachment Dec. 2 *136
Index Machine Model 50 machine May 6 *154
Jig boring with milling machines. Chris Sorenson....June 3 *119
Kendall Corp. face mills.....Jan. 15 *152
Kutscha Cutter face milling cutter July 1 *146
Large radius arcs cut on mill. J. E. Brophy....Mar. 11 *187
Machining copper and its alloys. J. J. McGurness....May 6 *109
Malnar Machine & Tool table for milling machine....July 29 *130
Milling machine column pointer resets table height. J. Cuyler.....Jan. 1 *106
Milling machine cuts slotted cams using removable fixtures on table. F. C. Lurz....Apr. [illegible] *121
Milling machine handles turning with swing too large for lathe. F. C. Lurz....Apr. 22 [illegible]
Milling machine turns collar. L. Deresh....Oct. 21 *12[illegible]
Milling-table stop aligns work. R. H. Kelsey....Mar. 25 *117
Milling way holder for rods replaces height-gage setups. John Neumann June 3 *119
Nelco Tool face-milling cutters..Dec. 2 *134
Nichols Corp. twin miller.....July 1 *146
Olsen Industrial Products gearhead for milling....Sept. 23 *164
Onsrud Machine Works contour machine....Sept. 23 *151
Palmer Industries milling attachment for lathes....Sept. 9 *158
Rouse attachments for hand miller Dec. 16 *150
Rubber jaws hold many pieces. A. F. Scoblic....Jan. 1 *105

(*) Illustrated (ed) Editorial

Rubber pads cushion gang milling setup on arbor extension. G. R. Milner....Oct. 21 *127
Rusnok Tool Works....June 3 *146
George Scherr Euco Micrometric milling spacer....July 1 *140
Severance Tool Industries carbide midget mills....Oct. 21 *154
Severance Tool Industries Micro-mills Mar. 11—220
Simplified machining produces complicated parts. Eklund & Shum Dec. 2 *96
Spare compound, cross-slide convert for milling work....July 15 *126
Sundstrand Machine Rigidmil machine Sept. 9 *146
Tree Tool & Die Works milling attachment....Mar. 11 *210
Tree Tool & Die Works milling machine boring tool....Feb. 26 *148
U.S. Machine Tool hand-feed miller July 1 *146
United States Machine Tool milling attachment....Dec. 16 *162
Versa-Mil machine tool attachment May 6 *142
Vitallium alloy can be drilled and milled with carbide cutters. Jesse Sdano....Nov. 18 *96
Wendt-Sonis milling cutter....Nov. 4 *152
Willey's Carbide Tool axial face mill May 20 *136
Work loaders applied to machine tools. Rupert Le Grand....Mar. 11 *160
Models—Three-dimensional model layout Oct. 7 *130
Modernization—B&O says it's "on time" with machinery replacement program. L. N. Sagle....Dec. 2 *70
Mogulizer — Metallizing Co. of America Dec. 2 *128

Molds and Molding:
Carbide inserts rejuvenate plastic transfer molds. A. L. Pranses....June 17 *95
Dynaflow rotors cast in plaster molds. Chester Ricker....Nov. 18 *120
Hydraulic Press Mfg. molding machine May 20 *138
MacRay Engrg. molding machine Dec. 30 *138
Moslo Machy. Minijector molding machine....Dec. 30—142
Myler Plastic Gladite molding powder Sept. 9—173
Product Technicians Prodel Process for molding....June 17—162
Ram ejects plastic parts. Frederico Strasser....Dec. 2 *103
Rohm & Haas molding powder. Aug. 26—144
Watson-Stillman heating cylinder for molding....Dec. 16—158
Monarch Machine Tool—lathes turn precision steel housings....Dec. 2 *100

Motors:
Allis-Chalmers tube type motors Dec. 2 *132
Allis-Chalmers Mfg. wound-rotor motors Apr. 22 *120
Burke Electric induction motors May 6 *156
Cramer self-starting synchronous motor Aug. 26 *140
Crozier Machine Tool heavy duty motor Feb. 12 *166
Fairbanks-Morse motorgears...Nov. 18 *172
Finishing steel cylinder sleeves, McCulloch Motors....June 3 *116
Fixture located rotor assemblies. W. C. Henderson....July 15 *119
Foster Mfg. capacitor-start motor Mar. 25 *160
General Electric Textolite motors Nov. 18 *172
General Electric Tri-Clad motor.. Sept. 23 *166
Hoover Kingston-Conley motors. Oct. 7 *166
Motor brushes finished in size by milling and lapping fixture. Edward Lay....May 6 *125
Motors rewired for new voltages. D. . Ziemke....Mar. 11 *188
Pistons and connecting rods machine-assembled at Rouge Plant of Ford Motor Co. C. S. Ricker....Apr. 8 *111
Polar Engrg. motor converters. Nov. 4 *158
Redmond fractional horse power motors....Apr. 8 *162
Slot liners for motors cut and folded in press, Westinghouse Electric.... June 3 *117
Smith Electrical Mfg. motors..Apr. 8 *160
Smith Mfg. fractional hp. motor May 6 *152
Triple-acting press assembles stators H. H. Geimeier....Mar. 25 *98
U.S. Electrical Motors Varidrive motor Nov. 4 *156
Wagner Electric inclosed motors Dec. 2 *144
Westinghouse Electric induction motoor Feb. 26 *154, Dec. 2—142
Westinghouse Life-Line induction motor July 29 *142
Westinghouse Electric Life-Line motor Apr. 22 *113
Westinghouse Electric vertical gearmotor....Apr. 8 *160
Wiring for electric motor circuits (Ref. Bk. Sheets)....Jan. 1—127
Work-handling devices simplify motor manufacture....June 3 *88

Mountings:
Aro Equipment tool-mounting fixture Aug. 12 *164
Continuous press foundations simplify layout charges. J. T. Snedden. Dec. 30 *71
Finn Finnflex Vibration Dampener.... May 20 *133
Lord Mfg. Chan-L-Mount vibration control....Aug. 26 *144
Lord Mfg. Shockmount mounting.... Aug. 12—168
Master bases cut fixture costs. Herman Goldberg....Dec. 2 *83-90
Shop shots at Lord Mfg. Co...Mar. 25 *96
Universal mounting holds work at odd angles for machining. F. Scriber.... Apr. 22 *96
Munitions—How to align long straightedges for gun mounts....Sept. 23 *99
Navy devises ingenious planer and boring-mill setups. Rupert Le Grand Oct. 7 *96

N

Nails—Black Industries nail-making machine....Oct. 21 *150
National Industrial Conference Board—job security No. 1 factor affecting employee morale....June 17—109
National Machine Tool Builders' Assn.—Atlantic City meeting....Nov. 4 *126
Meeting....Apr. 22—101
National Metal Congress and Exposition—Metal show in Philadelphia. Nov. 18 *132
National Production Meeting and Clinic Nov. 4—130
National Security Resources Board gives piant procedure on phantom orders Oct. 21—135
Starts working....Mar. 25—126
National Tool & Die Mfrs. Assn. meets Dec. 2—107, Dec. 16 *131
Neoprene boots protect cutters. J. W. Jones Nov. 18—116
Nichols, W. H. & Sons—free ring controls depth of hand-miller chamfer. Dec. 2 *101
Nickel—Process sheet for decorative nickel plating (Ref. Bk. Sheets)..Mar. 25—137
Nitriding stainless steel. S. Dedomenico Oct. 21 *96
Nitrogen, liquid, simplifies bearing assembly. R. E. Bludeau....Dec. 16 *82
Notching—Adapter plate and punch used for press-notching. H. A. Stran..May 6 *126
Numbering machines—Acromark Co..May 6 *148

Nuts:
Allen Mfg. self-anchoring wrenching nut....Mar. 11—210
Elastic Nut double hex nut..Sept. 23 *166
Grip Nut weld and lock nut..Dec. 30—156
Illinois Gage & Mfg. Speed-O-Matic nut setter....Dec. 2 *124
Illinois Gage & Mfg. torqueless nut setter....Feb. 26 *140
Lock-washer stop really stops. Dominick Pernini....Dec. 16 *123
National Machinery cold-nut formers for nut blanks....Oct. 7 *152
Noble & Stanton stud and nut set Mar. 11 *210
Northwestern Tool & Engrg. setup stud nut set....Mar. 11 *216
Palnut self-locking wing nut..July 29 *142
Prestole Corp. snap nut fastener.. Oct. 21 *170
West Point Mfg. stud and nut set Aug. 12 *158

O

Obsolescence—Sound replacement policy pays off (ed)....Aug. 12— 81
Oil burners—General Electric control for oil burners....Mar. 25 *154
Surface Combustion Corp. oil standby equipment....Jan. 1—129
Oil Mixer—Stewart-Warner Corp. soluble oil mixer....Oct. 7—160
Oil Reclaimers—Honan-Crane clarifier for coolants....July 29 *130
Oscilloscopes—Hickok Elec'l Instrument... Dec. 30—144

P

Packings—Hydraulic Accessories Monopak packing....June 17 *164
Quaker Rubber Daniel's P.P.P. packing....May 20—156

Paints and Painting:
Hangers for electrostatic painting. E. P. Miller, pts. 1 & 2 Aug. 12 *151, pts. 3 & 4 Sept. 23 *147
How to paint the product. H. E. Linsley pt. 1 July 15 *97, pt. 2 July 29 *89
Paint tank with adjustable rate of flow. C. S. Ricker....Nov. 4 *122
Paint Remover—Kelite Products....Oct. 7—162

Pallets:
Elwell-Parker Electric pallet retriever July 1 *138
Kerlow Steel Flooring line of steel pallets....June 17—148
Material Handling Equipment Uni-Rak pallet and rack combination..Nov. 4 *154
Monroe Auto Equipment collapsible pallet box....Mar. 25 *152
Pacific Chain & Mfg. skeleton pallet May 6 *152
Peening—Selective shot peening extends fatigue life of propellers. Epprecht & Eberhardt....Sept. 23 *95
Starrett ball peen hammer..Sept. 23 *151
Pencils—All-State Welding Alloys Kromover touch-up pencil....July 15—146
Pensions—Employers must talk with unions on pension plans....Oct. 21—138
Phantom orders plant procedure....Oct. 21—135
Photography—Bausch & Lomb Optical photomicrographic camera...Sept. 23 *160
Australian firm calibrates instruments photographically....May 20— 92
Pickling—Pickling drum at Worcester Pressed Steel....June 17 *94
Piercing - Pressures to pierce sheet metal. E. V. Sargeant (Ref. Bk. Sheets) pts. 1 & 2 Jan. 15 *139
Pins—Retractor pins align setup. L. Kasper June 17 *130

Pipes:
Angle iron jig checks pipe joints. Hans Schmidbauer....Mar. 11 *187
Flagg-Flow threadless pipe fittings.... Feb. 12 *164
Steam fitting turned accurately with ball-and-socket spacer bar. W. D. Stevens....Sept. 9 *128
U.S. Rubber plastic pipe....Aug. 26—144

Pistons:
Inverted tools cut and groove replacement pistons....Aug. 26 *100
Pistons and connecting rods machine-assembled at Rouge Plant of Ford Motor Co. C. S. Ricker....Apr. 8 *111
Sectional piston simplifies job when replacing worn component. L. H. Hardcastle....Feb. 26 *121
Snyder Tool & Engrg. machine assembles part of piston....Apr. 22 *122

Planers:
Auxiliary machine adjustment finds lost shaper motion. M. H. Ball Sept. 9 *127
Bar setup on planer locates trace used for turning hourglass shape. Ralph Egolf....Apr. 8 *122
Goose-neck cutter planes curved surfaces. G. R. Milner....Nov. 18 *128
Gray convertible openside planer Dec. 30 *144
Kennametal planer tools.... Dec. 2—128, Dec. 16 *152
Latch raises profiling tool for clearance on planer job. John Brown..Aug. 26 *110
Navy devises ingenious planer and boring-mill setups. Rupert Le Grand Oct. 7 *96
Planer makes helical cuts. George Lalak Jan. 15 *93
Reverend shaper tool doesn't dig in. S. B. Richey....Dec. 30 *116
Rockford Machine Tool shaper-planer Nov. 18 *148

Plant Layout:
Automobile wheel manufacture. Feb. 26 *84
Conveyor systems in die-casting plant June 17 *116
How materials handling affects plant layout. M. J. Rowan....Dec. 30 *83-98
Layout controls material and man movement, Lincoln-Mercury plant... Apr. 8 *85
Pentagonal layout table saves office space. A. M. Bowers....Nov. 18 *99

Plastics:
Carbide inserts rejuvenate plastic transfer molds. A. L. Pranses June 17 *98
Controlled cooling holds plastics in shape....Sept. 25 *123
Flame polishes plastics....Nov. 18—117

(*) Illustrated (ed) Editorial

Foster & Kester Krylon plastic spray Nov. 4—160
General Electric thermosetting plastics May 20—156
U. S. Rubber Versalite thermo-plastic material....June 17—168

Plates:
Angle-plate setup speeded by work-aligning attachment. H. Moore.... June 17 *129
Group parts multiple-machined; compound-angle plate, with tilting plate and swivel base. F. H. Scriber Apr. 8 *90
Herman Stone granite precision plate June 3 *148
How would you recondition a 10x20 ft. surface plate? Rupert Le Grand Nov. 4 *92
Lukens Steel spins 6-in. thick steel plate ....Apr. 8 *83
Sine plate hinged to base to support work on grinder. H. Childs..May 6 *126
Studs tapped in plate fixture. C. H. Willey....June 3 *122
Platforms—Yale & Towne Mfg. truck platform....June 17 *156

Plating:
Alarm clock starts plating-tank heat. Bernard Levowich....Dec. 30 *115
Bart-Blessing DC power unit for plating ....July 1 *136
Electroformed parts may be your answer....Nov. 18 *107
Enthone, Inc. Actane for cleaning surface for plating....Aug. 12—168
Hanson-Van Winkle-Munning plater's computer....Nov. 18—154
Midwest Chrome Process chromium plating....Dec. 2—138
Process sheets. George Black (Ref. Bk. Sheets)
Anodizing aluminum-alumilite surfuric-acid method....June 17 *141
Brush electroplating....Aug. 12—149
Cadmium plating....Feb. 12—145
Chrome-pickle treatment....Oct. 21 *141
Copper plating....Sept. 9 *139
Chromising steel....July 29 *123
Decorative chromium plating..Mar. 11 *203
Dichromate treatment of magnesium May 6 *135
Indium plating....May 6 *139
Industrial chromium plating..Oct. 7 *135
Rhodium plating....Dec. 2 *117
Sodium hydride descaling....Dec. 30 *127
Zinc-immersion treatment....July 15 *135
Zinc electroplating....July 1—127
Udylite Corp. plating machine..Feb. 12 *156
Zinc film permits plating on magnesium. H. K. DeLong....May 6 *98
Pliers—Lapeer Mfg. Knu-Vise pliers Aug. 26 *134
Osborn Mfg. punch press feeding pliers Dec. 16—154
Plugs—Mechanical Products Hydro-Matic self-sealing test plugs....Sept. 9 *152
Pneumatic tools—Air-powered devices increase machine output. Rupert Le Grand....Mar. 25 *88

Polishing and Buffing:
Breuer Electric Mfg. floor machines Aug. 12 *156
Brown & Sharpe Mfg. machine..Sept. 9 *152
Bull buffing tool....May 20 *142
Cross Transfer-matic boring and finishing machine....July 29 *132
Divine Bros. contact wheel polisher May 20—156
Flame polishes plastics....Nov. 18—117
Hanson-Van Winkle-Munning color buffing....Sept. 23—164
Jackson Buff Corp. Airway polishing wheel....Aug. 26 *142
Michael Wood Products Kube-Kut sawdust for polishing....June 17—162
Packer Machine abrasive belt head for polishing....Apr. 8 *156
Square Deal Machine buffer...June 3 *148
Van Dorn Electric Tool electric polishers....Dec. 30—134
Vanott Machine automatic polisher... July 1 *144
Vanott Machine Corp. machine..Apr. 8 *154
What to watch in metal-polishing costs. E. C. Beam....Aug. 12 *87
Positioners—Kinmont Mfg. power tool.. Sept. 9 *150
Wilton Tool Mfg. Powrarm positioner Nov. 4 *152
Potentiometer—General Electric—for measurement of low voltages....June 17 *152
Prefabricated houses....Nov. 18—138
Preforming—National Machinery Reduceroll preforms forging blanks....Nov. 18 *150
Stokes Machine dual pressure preformers....Nov. 18 *160

Presses:
Ace Tool & Die Works Flexpress.. Nov. 18 *160
Alpha Tool Works die press....Mar. 11 *222
Alpha Tool Works die-tryout press June 3 *144
American Gage & Machine punch press Jan. 15 *154
Arbor press handles precision tapping. Joe Manius....Oct. 7 *123
Bellows air-operated impact press.... May 6 *144
Bellows BAP-20 press....Aug. 12 *158
Bliss die-hobbing press....July 15 *146
Bliss flywheel inclinable press..Dec. 16 *156
Bliss progressive die press....Apr. 22 *128
Bliss welding press....May 20 *144
Cam-locking, delayed-action die force fits ball handle on upstroke. J. F. Budnick....Sept. 9 *124
Canedy-Otto Mfg. Infi-Speed drillpress Mar. 11 *220
Clearing Machine spot-welding press. Sept. 9 *158
Cleveland Crane & Engrg. bending press....Dec. 2 *132
Cleveland Crane & Engrg. 500-ton press Jan. 1 *130
Cleveland Crane & Engrg. Steelweld press....Nov. 18 *158
Colonial Broach straightening press.... Aug. 12 *164
Continuous press foundations simplify layout changes. J. T. Snedden.... Dec. 30 *71
Cracks in presses repaired quickly. J. W. Hillhouse....Aug. 26 *73
Denison Engrg. Rocket Multipress.... Aug. 26 *130
Diamond Machine Tool geared press July 1 *138
Diamond Machine Tool punch press July 15 *148
DoAll metal powder press....Feb. 26 *144
Dremel Mfg. drillpress....Feb. 26—152
Durant Tool Supply scrap chopper attachment....Feb. 12 *162
Elmes Engrg. Works press intensifier Oct. 7 *156
Elmes Engrg. Works tube bending press Oct. 7—146
Fundamentals of cold heading. H. E. Linsley.... Apr. 8 *99-110
General Mfg. die testing press..May 20 *134
Graymills Corp. oiling unit for presses July 29 *144
Greenerd Arbor Press....May 20 *148
Hannifin Corp. arbor presses..Jan. 15 *158
Hannifin Corp. hydraulic press..Feb. 26 *142
Howe & Fant Lign-o-matic drill turret May 6 *150
Hydraulic Press Mfg. drawing press Aug. 26 *134
Hot plate press ....Jan. 15 *156
Laboratory press....Apr. 22 *122
Plastic molding press....Nov. 4 *150
Press for straightening weldments Mar. 25 *146
James Industries portable press..May 20 *144
Knight Machy. press brake....Dec. 2 *126
Kux Machine injection pressure multiplier....Feb. 26—144
Lathe and drillpress combined reduces handling. B. W. Mansberger..Jan. 15 *122
Lima-Hamilton strip-feed press..July 1 *140
M & N Machine Tool Works die-shearing press....Apr. 22 *140
M & N Machine Tool Works hot plate press ....Apr. 22 *138
Makeshift 80-ton clamping press flattens explosion-damaged pans.Oct. 7 *121
Mead Specialties air press....Aug. 26 *130
Mercury Engrg. hydraulic press..Sept. 9 *164
Micro Switch safety device for presses Dec. 2 *123
Munton Mfg. air press....June 3 *146
Munton Mfg. motorized press..Apr. 8—150
Munton Mfg. press brake....Oct. 21 *150
Niagara Machine & Tool Works.... Aug. 12 *156
Niagara Machine & Tool Works straight-side press....Dec. 30 *140
Paragon Metal Products air conversion unit for converting presses..Oct. 7 *164
Paragon Metal Products sub-presses.... Apr. 22 *124
Peerless Roll Leaf stamping press.... Aug. 26 *130
Presco PA7 bench type press..Feb. 26 *146
Rettig Engrg. turret press....Dec. 2 *126
Robot hydraulic press forges heavy-duty parts....Sept. 23 *124
Roll-Feeds Corp. press feed....Feb. 26 *140
Rotating drillpress table speeds tapping operation. Harold Greuel....July 29 *109
Sahlin Engrg. Iron Hand press unloader....Dec. 16 *144
Sales Service Machine Tool Press-Rite....July 1 *144
Schill Corp. die-hobbing press..Jan. 15 *156
Service Machine Rousselle horning press Mar. 11 *214
Service Machine Rousselle press.... Oct. 21 *162
Smith & Associates Select-O-Matic power press feed unit....Nov. 4 *165
South Bend Lathe Works drill press Mar. 11 *205
Steam generator cleans presses. B. C. Higgins....July 1 *111
Stokes Machine dual press..Nov. 18 *160
Stokes Machine plastic-molding press Oct. 7 *146
Stokes Machine 12-ton press...Oct. 7 *152
Studebaker Machine portable press Sept. 9 *156
Tandem press loader uses air cylinder. J. F. Budnick....Jan. 1 *104
Triple-acting press assemblies stators. H. H. Geimeier....Mar. 25 *98
U. S. Tool slide feed press..Nov. 4 *150
Universal Vise & Tool drill press Feb. 12 *160
Universal Vise & Tool workholder fits drill press....May 20 *148
Verson Allsteel Press—for ferrous and non-ferrous metals....July 1 *138
Verson Allsteel Press varied operation press ....June 17 *156
Walsh Press & Die press trim die castings ....Apr. 8 *148
Watson-Stillman demounting press Nov. 18 *156
Watson-Stillman portable press Sept. 9 *158
Winter Products spring air press June 17 *158
Wood HydroElectric open-gap press Dec. 30 *150
Press brake—Cincinnati Shaper two-housing mechanical press brake....May 20 *142

Prices:
How to lower prices (ed)....Jan. 1— 67
Short-run economic effects seem small in steel's pricing change....Sept. 9—132
What's happened to prices. 1941-1947 (table)....Jan. 29—120

Printing:
Black Industries tension unit for web processing unit....Dec. 30 *140
Bruning, Charles, BW Whiteprinter Sept. 23 *156
Pannier Corp. printing machine Sept. 23 *152
Replaces hand filling of embossed surfaces. H. O. Bates....Apr. 22 *89
May 20—109
Reproduction Products Direc-Liner machine ....June 3 *152
Tension web for web processing Nov. 18 *160

Production Control:
AMA survey finds eight pressing problems ....Nov. 18—137
Annual improvement factor (ed) June 17— 89
Electrical control units produced in progressive die equipped with hopper feed. Paul Bonness....May 6 *96
Ford handles by automation. Rupert Le Grand....Oct. 21 *107-122
General Iron Works, a cooperative manufacturing pool. H. S. Wharen May 20 *94
"The guy with the figgering board" saves $50,000....Dec. 2— 69
Ingenious equipment modifications increase production. Rupert Le Grand June 3 *90
Kodak manufacture. H. E. Linsley Oct. 21 *98
Merry-go-round conveys radio-chassis assembly. Henry Gillig....Oct. 7 *90
Practical inspection lowers scrap and rework in ball bearing plant. Jack Shafer ....Dec. 16 *112
Process control corrects faulty methods. C. S. Ricker from interview with R. H. McCarroll....June 3 *112
Simplified control reduces paper work Feb. 25 *92
We need more "multipliers" (ed) July 29— 71
Profit Sharing—Profit sharing can work in a free-enterprise system. C. A. Norgen Mar. 25 *83
Protractor sets angles on ends of bar stock and tubing. M. R. Hammond..July 15 *126
Public Relations—Naugatuck Valley Industrial Council experiments with public relations ....Apr. 8—119
Puller—Coffing Hoist Mighty Midget puller Jan. 15 *152
Pulleys—Tabulated constants for pulleys found with form-tool mathematics. D. E. Sweet....Nov. 18 *129

Pumps:
Allis-Chalmers coolant pumps..July 15 *142
Beacham swashplate pump....July 15 *142
Ellipse Corp. rotary pump....Mar. 25 *162
General Scientific Equipment drum pump Dec. 16 *144
Honan-Crane sump cleaner....May 6 *150
Lyon-Raymond power operated pump Sept. 9 *174
Mechanical Products Metering Pump Aug. 26 *136
Polo Pump—for direct motor type drive Sept. 23 *164
Precision Products oil pump....Mar. 25 *156
Racine Tool & Machine vane-type pump Feb. 12 *166

(*) Illustrated (ed) Editorial

Ruthman Machy. Rumaco pumping unit Nov. 18 *174
Siefen circulating pump.....Aug. 12 *156
Sundstrand Machine Tool.....Apr. 22 *113
Sundstrand Machine Tool constant-displacement pump.....Jan. 1 *144
Universal Hydraulic Machinery pumping units .....Sept. 9 *168

Punches:
An-Dean Mfg. Jiffy Production Service Oct. 7 *142
Beatty Machine & Mfg. double-end punch July 15 *152
Benchmaster Mfg. punch press..Sept. 23 *162
Blum punching machine.....Dec. 30 *131
Compound die and punch plant reduces operations from six to one. J. J. McGuinness .....May 20 *106
Dayton Rogers Mfg. hydro-pneumatic overload punch press.....Aug. 26 *142
Double punch blanks and pierces straight-sided rubber washers. Joseph Budnick .....Dec. 16 *121
Europe tools for extrusion. John Everhart .....Dec. 2 *67
European punch guides simplify die making. Frederico Strasser..Nov. 18 *130
Graham Specialty punch press..Oct. 7 *152
How to get the most out of punch presses. E. H. Girardot. pt. 1 Feb. 26 *79; pt. 2 Mar. 11 *174; pt. 3 Mar. 25 *108; pt. 4 Apr. 8 *116; pt. 5 Apr. 22 *86; pt. 6 May 6 *114
Hydraulic units power machine elements. L. W. Court.....Aug. 12 *83
Leslie Welding hand punch press Aug. 26 *130
M & M shim-stock punch.....July 15 *150
O'Neil-Irwin Mfg.....Aug. 26 *130
Oscillating stop positions stock for punch-press blanking operation. Gustave Remacle.....Aug. 12 *128
Pioneer Broach chassis punches..Oct. 7 *144
Porter Precision Products head-type punches .....Sept. 9 *162
Production with pre-parting punch makes teardrop sheet-metal shape. Walter Gabriel .....Sept. 9 *126
Producto Machine punch holder Mar. 11 *216
Progressive Welder punching units Dec. 30 *146
Punch design reduces stressed for blanking and perforating. Frederico Strasser .....May 6 *127
Punch holder locates large holes. Hans Schmidbauer .....Feb. 26 *118
Punch-press inspection chart....May 6—137
Roller-grip pneumatic attachment feeds strip stock to punch press. S. H. Pearson .....July 29 *108
Rugged punch pinned to block. S. Framurz .....Dec. 16 *124
Shift bar controls action of floating punches. L. F. Stull.....Dec. 30 *115
Small punch draws deep shell. W. Z. Nesin .....June 3 *119
Strip-stock distortion stopped by punch-press methods changes. S. Framurz June 3 *121
V-tapered rollers center bars for punching. H. Moore.....Oct. 21 *130
Wales-Strippit sheet metal fabricator punch .....July 1 *144
Pusher—Sheffer Collet Better Bearing Master pusher.....June 17 *162
Pyrometers—Bristol Model IE486.Sept. 23 *152
Pyrometer Instrument radiation instrument .....Mar. 25 *142

Q

Quality Control—Process control corrects faulty methods. C. S. Ricker; from interviews with R. H. McCarroll June 3 *112

R

Racks—Bins and racks aid raw-material warehousing. R. O. Fristoe.....Aug. 12 *116
Compact chute rack stores motor frames. J. F. Miller.....June 17 *102
Shaper cuts rack in sections. U. Wheatley Mar. 11 *185

Radii:
Arcmeter Co. radii for drawing and checking .....July 1 *138
Depth gage and ground block measure curved-surface radii. Ray Cafiero. Sept. 23 *134
Radius-cutting lathe tool mounted in toolpost. A. B. Nixon.....Nov. 4 *120
Vernier caliper measures radii of partial sections. C. T. Bower Dec. 2 *105
Radio—Merry-go-round conveys radio-chassis assembly. Henry Gillig.....Oct. 7 *90

Railways:
B&O says it's "on time" with machinery replacement program. L. W. Sagle Dec. 2 *70
Coal hopper cars welded by ACF July 29 *116
Freight car fabrication fixturized (pic ture feature).....Feb. 12 *120
Railways—see also Locomotives
Ramp, floating, at materials docks Aug. 12 *118
Ranges—Precision welding jigs simplify stove assembly. Walter Rudolph July 1 *82
Razor-blade tool finishes lead. G. R. Milner Nov. 4 *123

Reamers and Reaming:
Baker Bros. multiple-operation machine July 15 *148
Bar-type reamer cuts smooth bore using hardened circular cutter. G. R. Milner May 20 *116
Cook Mfg. multi-operation carbide tipped cutting tool.....May 20 *142
Erickson Tools reamer holder..Apr. 22 *120
Federal Machine & Welder drilling and reaming machine.....Jan. 1 *136
Reverse reamer transfers holes. Thomas Patell .....Nov. 18 *127
Severance Tool Industries carbide finishing tool.....Aug. 12 *164
Severance Tool Industries reaming and and drilling machine.....July 1 *134
Sharpening carbide reamers. (Ref. Bk. Sheets) pts. 1, 2 & 3.....Aug. 26 *123
Simplex Tool Engrg. reaming and drilling machine.....Nov. 18 *150
Super Tool Ream-Rite, carbide-tipped reamers .....May 6 *148
U. S. Carbide Tool special reamer Dec. 16 *152
U. S. Reamer & Tool single blade expansion reamer.....June 3 *144
U. S. Tool & Mfg. rolling process for reamers .....Mar. 25 *150
Wendt-Sonis Spe-D-Cut reamers May 20 *144
Recorders—Electric-Arc recorder and controller .....Dec. 2 *138
Foxboro multi-record Dynalog electronic recorder .....Dec. 2 *138
Recording Devices—K. & H. Industrial Products line of cubicles for recording Dec. 2—138

Rectifiers:
Bart-Messing Corp. Sel-Rex selenium rectifier .....Feb. 26 *146; May 20 *154
Mellaphone Electronic machine..Mar. 11 *224
Richardson-Allen units for nickel and copper .....Oct. 7 *144
Reed-Prentice—radials cut boring costs 24.3% .....Dec. 16 *109
Reels—Aero-Motive Mfg. self-winding tool reel .....Oct. 21 *154
LaBahn Machine & Mfg. stock reels May 20 *140
Reference Book Sheets..Jan 1—123; Jan. 15—139; Jan. 29—297; Feb. 12—145; Feb. 26—133; Mar. 11—199; Mar. 25—133; Apr. 8—141; Apr. 22—107; May 6—135; May 20—127; June 3—133; June 17—141; July 1—127; July 15—135; July 29—123; Aug. 12—149; Aug. 26—123; Sept. 9—139; Sept. 23—145; Oct. 7—135; Oct. 21—143; Nov. 4—135; Nov. 18—141; Dec. 2—117; Dec. 16—135; Dec. 30—125
Reflectoscope—Sperry Products....Aug. 12 *164
Refractories—Johns-Manville castable refractories .....Sept. 23—166

Relays:
Allied Control A S relay.....June 3 *154
Allied Control single pole type..Apr. 22—124
Allied-Control Type BK relay..July 29 *144
Graybill plug-type connectors on relay Apr. 8 *160
Manning, Maxwell & Moore micro-sensitive relay.....May 6 *156
Square D DC multi-pole relays July 1 *148
Tricky tooling cuts relay costs. Paul Bonness .....Jan. 1 *93
Ward Leonard Electric time-delay relay June 3 *150
Westinghouse magnet-operated relay June 3 *160

Reports to the Metalworking Industries
Adhesives for metalworking. H. E. Linsley .....Feb. 12 *107-118
Appraisal of metalworking with statistical summary.....Jan. 29 *105-126
Ford handles by automation. Rupert Le Grand.....Oct. 21 *107-122
Fundamentals of cold heading. H. E. Linsley .....Apr. 8 *99-110
Handbook of horizontal broaching fixtures. B. C. Brosheer....Dec. 16 *93-108
How materials handling affects plant layout. M. J. Rowan.....Dec. 30 *83-98
How smooth is smooth? B. C. Brosheer. pt. 1 Sept. 9 *97-112, pt. 2 Sept. 23 *111-126
How to design work coils for induction heating. B. H. Griffith, Jr. & Ray Skiba.....Aug. 12 *99-110
How to evaluate supervisory jobs. O. R. Winjum .....Aug. 26 *81-92
How to finish copper and copper alloys Feb. 26 *95-106
How to keep your employees informed. Burnham Finney.....Mar. 25 *99-106
How to paint the product. H. E. Linsley. pt. 1 July 15 *97-112, pt. 2 July 29 *80-100
How to reduce costs of thin metal stampings. W. C. Mills..June 3 *99-106
How to use helium-shielded arc welding. H. O. Jones.....Nov. 4 *101-116
How to work aluminum and its alloys. Anderson Ashburn.....July 1 *85-100
Is metalwork moving?....Aug. 12 *111-114
Machining copper and its alloys. J. J. McGuinness .....May 6 *101-112
Master bases cut fixture costs. Herman Goldberg .....Dec. 2 *83-90
Modern industrial safety equipment. Anderson Ashburn.....Oct. 7 *101-116
Vertical surface-broaching fixtures. B. C. Brosheer .....pt. 1 Jan 1 *77-92 pt. 2 Jan 15 *101-116
When and how to swage. Anderson Ashburn .....Apr. 22 *77-84
Work loaders applied to machine tools. Rupert Le Grand.....Mar. 11 *149-172

Research
Market research will help small companies. M. G. Jenkins.....Aug. 26—104
Resin tape—Hanson-Van Winkle-Munning Wrap-Rax tape.....Sept. 23 *164
Retaining ring—Ramsey Corp. Spirolox ring Aug. 26—144
Rhodium plating process sheet. George Black. (Ref. Bk. Sheets)....Dec. 2—117
Rik-Mobile .....Apr. 8 *132

Rivets and Riveting:
Colonial Alloys process for anodizing rivets .....Aug. 26—142
Grant Mfg. & Machine noiseless rivet-spinning machine.....Aug. 12 *162
Gries Reproducer tubular rivets Sept. 9—168
High Speed Hammer riveting machine July 29 *134
Schlack Mfg. hammer action riveting machine .....July 29 *134
Snyder Tool & Engrg. special machine July 29 *140

Rotors:
Dynaflow rotors cast in plaster molds. Chester Ricker.....Nov. 18 *120
Fixture located rotor assemblies. W. C. Henderson .....July 15 *119
Planer makes helical cuts. George Lalak Jan. 15 *93
Production grinding Alnico rotors. R. E. Roberts .....Aug. 12 *95
Rotor shaft turned on automatic screw machine .....Aug. 26 *100
Roughness—How smooth is smooth? B. C. Brosheer, pt. 1 Sept. 9 *97, pt. 2 Sept. 23 *111
Round table.....Jan. 1—102; Jan. 15—118; Feb. 12—119; Feb. 26—116; Mar. 11—173; Mar. 25—116; Apr. 8—120; Apr. 22—85; May 6—122; May 20—114; June 3—111; July 1—110; July 15—122; July 29—105; Aug. 12—125; Aug. 26—107; Sept. 9—123; Sept. 23—129; Oct. 7—117; Oct. 21—123; Nov. 4—119; Nov. 18—126; Dec. 2— 91; Dec. 16—119; Dec. 30—114.
Rubber-cork, laminated, for vibration and noise .....Oct. 21—176
Rubber, synthetic—Felt Products Mfg. Fel-Pro product.....Mar. 25—156

Russia:
Industrial claims.....Jan. 1—110
1900 plants built, restored since war June 17—134
Soviet steel industry attempting to meet 1950 schedule early.....Mar. 11—192

S

Safety:
Employees run safety program. Victor Gruendler .....Dec. 30 *78
How safety adds to profits. E. E. Juckett May 20—108
Jib cranes cut down sources of fatigue and injury. D. A. Johnson July 29 *101
Machine-shop safety practices reduce lost hours .....Aug. 12 *121
Modern industrial safety equipment. Anderson Ashburn .....Oct. 7 *101-116
Oxyacetylene gas as a hazard. Phil Glanzer .....May 20 *115
Safety—see also guards
Sales course held by machine tool industry —symposium .....Aug. 12 *135

Sanders
Atlas Press disk sander.....Dec. 2 *126
Sapphire Balls—Linde Air Products July 29—144
Sapphire tip bores bushing. C. C. Scott July 29 *83

Saws and Sawing:
Air Speed Tool saw and file....Dec. 16 *158
Angle irons clamp stock in saw. Bernard Levowich .....July 1 *114

(*) Illustrated (ed) Editorial

Circular Tool carbide tipped saw Mar. 11 *218
Cutoff saw is surface ground to reduce thickness of edge. N. L. Naidish June 3 *122
DoAll diamond band saw machine Mar. 11 *208
DoAll spiral saw band.....Apr. 22 *122
DoAll utility sawing machine....Oct. 21 *156
Double saw doubles cutoff. Stanley Sumski .....June 3 *121
Drillpress grinds slitting saw. H. Scala May 20 *119
Farrell Machine band saw....Sept. 9 *156
Foster Mfg. arbor saw with miter gage Jan. 15 *152
Foster Mfg. band saw.....Oct. 21 *152
Friction circular sawing. (Ref. Bk. Sheets) .....Sept. 9 *141
Handling spells economy at power saws. Benjamin Melnitsky.....Jan. 1 *74
Johnson Mfg. Corp. band saw..June 17 *158
Miller Falls hack saw blades....Dec. 16—163
Lipe-Rollway Corp. power hack sawing machine .....Apr. 22 *124
Macduff cement-carbide sawing machine Oct. 21 *158
Meyers carbide-tipped circular saws Feb. 12 *156
Miller Falls hack saw blades...Dec. 16—163
Miller Falls hack saw frame.....Dec. 2 *13
Pipe and angle-iron band saw driven from engine lathe head. Alois Steiner Aug. 26 *110
Racine Tool & Machine metal cutting saw .....Feb. 12 *158
Reltool Corp. slitting saw.....Mar. 11—220
Sawability recommendations for copper and copper alloys (table)....May 6—110
Tricky tooling cuts relay costs. Paul Bonness .....Jan. 1 *93
V-W Specialists Clever saw....Aug. 26 *134
Wells Mfg. metal cutting saw..June 3 *148
Wells Mfg. wet-cutting saws....Dec. 30—144
Sawdust—Michael Wood Products Kube-Kut sawdust for polishing....June 17—162
Scales—Triangle Package Machine Elec-Tri Pak weigher.....Nov. 4 *152
Yale & Towne Mfg. crane scale Nov. 18 *158

Scrap:
Durant Tool Supply scrap chopper attachment .....Feb. 12 *162
Preparing scrap to bring a premium. C. W. Cederberg.....June 3— 98
Safety scrap coiler used at Worcester Pressed Steel.....June 17 *93
Scrapers—Draw-cut scrapers clean up does deburr holes and finish patterns. L. R. Fitsimmons .....Mar. 25 *121

Screw Machines:
Brown & Sharpe Mfg. screw-machine tools .....June 17 *154
Burg Tool Mfg. Tool-Flex holder for machines .....Jan. 1 *136
Carbide feed rolls used on automatic screw machine.....Oct. 21—125
Cleveland Automatic Machine turns and faces bearing races.....Sept. 23 *130
Greenlee Bros. 4-spindle screw machine Dec. 2 *124
Karge & Son Machine Turnomats devices Dec. 16 *141
New Britain Machine Model 602 machine .....Aug. 26 *130
Rotor shaft turned on automatic screw machine .....Aug. 26 *100
Threads rolled in screw machines. C. R. Morgan .....July 15 *116
Weight tables for screw-machine products (Ref. Bk. Sheets) pts. 1, 2 & 3 Dec. 16 *135
Worm generation added to screw-machine cycle.....Aug. 26 *101

Screwdrivers:
Aro Equipment Corp. reversible type screwdriver and nut setter..Aug. 12 *166
Aero Equipment Corp. screwdriver and nut setter.....Oct. 21 *150
Aero Tool ratchet screwdriver..Nov. 18 *154
Plomb Tool plastic-handle screwdriver June 17 *150
Reed Prentice automatic screwdriver Dec. 16 *152
Rotor Tool Midget screwdriver Mar. 11 *206
Rotor Tool Midget screwdriver with pistol grip.....Mar. 11 *208

Screws:
Cold heading cuts manufacturing costs C. S. Ricker.....Feb. 26 *89
Diamond Head Screw self-locking cap screw .....Dec. 30 *154
Dodge Mfg. Corp. screw take up Nov. 4 *156
English speaking countries plan unified system of screw threads.....Oct. 21—138
Hex heads milled in three passes with indexing table. Robert Mawson. Jan. 1 *106
How to turn non-standard threads. E. L. Schlage .....Feb. 12 *95
Machine screw taps. (Ref. Bk. Sheets) July 29 *127
Socket-head screw finishing mechanized Nov. 18 *95
Standard screw threads can be measured with micrometer and adapter. Charles Shope .....Oct. 21 *126
Stud and setscrew bin inside fixture handle. B. D. Campbell....Nov. 4 *124
Waterbury Farrel Foundry & Machine screw slotters.....Apr. 22 *128
Wire, machines and processes mean better cold headed brass. W. D. France Feb. 12 *96
Sealants—Western resin sealant for pressure castings Dec. 16—163
Sealing—Durametallic Corp. Dura Seal Aug. 26—142
Selectors—Sunset Equipment McKelvey selector .....Jan. 15 *160
Surface Combustion Corp. gas selector Jan. 15 *152
Sellers, Wm. & Co. Celebrates 100th anniversary .....Aug. 26 *115

Separators:
Chicago Mfg. & Dist. Model E Mar. 25 *142
Dings Magnetic Separator....Mar. 25 *142
May 20 *148
Sturgis Products Roto-finish mechanical separator .....Dec. 2 *130

Shafts:
Centering fixture aligns shafts for keyseating. E. F. Abel.....Dec. 2 *104
Double-gear screw machine tool turns external radius on shaft. Theodore Oshinsly .....June 17 *127
Electro-Mechano flexible shaft Feb. 12 *152
Elliott Mfg. flexible shaft machine Aug. 12 *155
Gits Bros. Mfg. Roto-Flex shaft seal Dec. 16 *165
L & R Mfg. radio handpiece with Jacobs' chuck for shaft machines Oct. 7 *156
Minimum hub diameters. B. P. Astley. (Ref. Bk. Sheets).....Dec. 30 *129
Procedure for finishing shoulders. L. F. Cheek .....Mar. 25 *119
Rotor shaft turned on automatic screw machine .....Aug. 26 *100
Scale block speed shaft layout. A. B. Nixon .....Mar. 25 *118
Serrated, tapered shaft produced by tool held in lathe turret. G. R. Milner June 3 *118
Small thrust collars save shaft space. M. H. Ball.....Jan. 1 *108
Spatter mix protects shaft. Francis Aimers .....Nov. 4 *124
Stow Mfg. flexible shaft.....Feb. 12 *156
Stow Mfg. flexible shaft machines Sept. 9—146
Strand Rotaflex flexible shaft machine Jan. 1 *142
V-block guides punch and drill for shaft layout and machining. George Holman .....Apr. 22 *98

Shapers:
Auto wheel replaces shaper crank. G. W. Wilson.....Mar. 25 *117
Clock spring lifts shaper tool, protects work on return stroke. Daniel O'Leary July 15 *128
Michigan Tool Shear Speed shaper June 3 *140
Old shape sets up new block for shaping job. Gustave Remacle Dec. 30 *116
Rockford Machine openside shaper Mar. 25 *144

Shear and Shearing:
Beverly Shear Mfg. shear stand Dec. 16 *156
Cincinnati Shaper all-steel shear Nov. 18 *156
Die spring deflects under heavy shearing side load. Roger Isetts Oct. 7 *120
Federal Machinery Shear Oct. 21 *148
Framco Machine power shears Sept. 23 *158
Kling Bros. rotary shears ...Aug. 12 *158
National Machy. & Equipment gap shears .....Dec. 2 *130
Niagara Machine & Tool Works June 3 *150
O'Neil-Irwin Mfg. Di-Arco shearing unit.....Jan. 1 *134; Dec. 2 *130
Plastic strip improves shears. Bernard Levowich .....Aug. 26 *112
Shear facts.....Nov. 4— 91

Sheaves:
Dodge Mfg. Corp. variable pitch sheaves Jan. 1 *144
Howry-Berg Steel & Iron Works pressed steel sheave.....June 3 *158
Ingenious tooling cuts sheave costs. Carl Shank .....Mar. 11 *178
Shelf boxes—Bay, Inc.....Jan. 15 *146
Shelf drawers—Bay, Inc.....Jan. 15 *146
Shells
Progressive die scores, trims and forms heavy shell. Theodore Oshinsly Sept. 9 *85

Shelving
Tri-State Metal Products steel shelving Nov. 18 *156
Shims of paper correct fit of jigs. H. S. Galus Feb. 26—122
Shim Sets—U. S. Gasket & Shim Co. July 1 *148
Shipments of machinery 1946 and 1947 (tables) .....Jan. 29—112
Shipments of passenger cars, trucks, machine tools, refrigerators, washers, fractional horsepower motors, freight cars 1941, 1946, 1947 (chart).....Jan. 29—113
Shipyards boosted by orders for ships Sept. 9—131

Shops:
How to deal with contract shops. J. S. Denison.....Nov. 18 *100
Short cuts for the small shop. A. H. Waychoff.....Jan. 1 *76; Jan. 15 *89; Feb. 12 *128; Feb. 26 *107; Mar. 11 *182; Mar. 25—87; Apr. 8 *115; Apr. 22 *73; May 6 *95; June 3 *115; June 17 *123; July 1 *105;; July 15 *115; Sept. 9 *96; Sept. 23 *110; Oct. 7 *94; Nov. 4 *97; Dec. 2 *99; Dec. 16 *83.
Southern shop of long ago. R. E. Trospect .....May 20 *93

Shows:
American Society of Tool Engineers exhibitors in exposition.....Mar. 11 *127
American Society of Tool Engineers exposition in print.....Mar. 11 *205
British Machine tool show.....Sept. 23 *135
Materials Handling Exposition exhibitors .....Dec. 30—111
Materials Handling Exposition in print Dec. 30 *100
National Metal Congress and Exposition Nov. 18 *132
National Plastics Exposition....Oct. 21 *131
Signs, adjustable, call truckers.....Apr. 22 *97
Silicones—What they are and what they do. W. T. Eveleth.....Nov. 18 *91
Silver alloy—Eutectic Welding Alloys Corp. Dec. 30—142

Skids:
Automatic Transportation Transtractor Aug. 26 *130
Palmer-Shile corrugated skid..July 15 *150
Palmer-Shile steel skid.....June 3 *144
Skin ointment—Cutter Laboratories dermesthetic ointment.....Jan. 1—144
Slide rules—Pickett & Eckel Ortho-phase Log-log rule.....May 6—150
Plus & Minus Corp.....Apr. 22—116

Slotters and Slotting:
Fixtures hold pins for milling. H. Moore .....Apr. 8 *125
Saw-tooth aligns drill for machining out slots. H. Moore.....Sept. 9 *127
Slotting replaces broaching in end of boring bar. Roger Isetts.....Dec. 2 *106
Waterbury Farrel Foundry & Machine screw slotters.....Apr. 22 *128
Smith, A. O. Corp.—shop shots....July 15 *120
Society for the Advancement of Management Exposition and conference Nov. 18—135
Sodium hydride descaling process sheet. George Black. (Ref. Bk. Sheet) Dec. 30 *127

Solder and Soldering:
Alpha Metals Tri-Core Leakpruf solder June 17—168
Hexacon Electric soldering iron Sept. 23 *156
Joyal Products machine for small jobs July 1 *134
Spiral blade silver soldered in standard butt-weld machine. Alexander Maxwell .....Sept. 9 *126
Sully Engrg. Crown Torch..Mar. 25 *144
Weller Mfg. soldering gun....July 29 *134
Westinghouse Electric Carbon-Arc torch Mar. 25 *144

Solvents:
Oakite Products paint removal Sept. 23—166
Safe use of organic solvents. (Ref. Bk. Sheets) .....Nov. 18—145
Swan-Finch Oil Hydro-Solv gum sludge solvent .....Sept. 9—168
Sonic vibrations measure cylinder-head volume capacities.....Oct. 21 *148
Southern shop of long ago. R. E. Trospect May 20 *93
Spacers support small thin stock in lathes. A. B. Nixon.....Apr. 22 *98
Specifications—how to deal with contract shops. J. S. Denison.....Nov. 18 *100
Speed recorder—Electric Tachometer speed and production recorder....July 1 *146

Speed Reducers:
Boston Gear Works speed reducer Nov. 18 *176
Metron Instrument speed changers Mar. 25 *158
Michigan Tool heavy duty reducers May 6 *158
Philadelphia-Reliance GearMotor speed reducer .....July 15 *154
Smith Corp. differential speed reducer Nov. 18 *178
Spheres turned on lathe with templet and follower fixture. F. G. Fonquen Feb. 26 *119
Spherical meter seat made with rotating toolblock .....Aug. 26 *101
Spinning—Lukens Steel spins 6-in thick-steel plate .....Apr. 8 *83

(*) Illustrated (ed) Editorial

Skimmer disks produced faster by spinning. G. H. Cottrell.....Aug. 26 *78
Spray cabinet.....June 17 *93
Spray metal to rebuild parts of machines—failures to avoid. J. E. Wakefield Sept. 23 *100

Springs:
Drilled block fitted on lathe to wind coil springs on arbor. J. J. Moffett May 20 *116
Fixture on drill tests springs by deflection check on samples. Fred Lettino Apr. 22 *97
Fixture winds special springs. J. F. Bolton .....Apr. 8 *122
Gardner Wire tools and stock spring kits .....Sept. 9 *160
General Cement & Mfg. Speedex spring maker .....Dec. 2—134
Hunter Pressed Steel load tester Oct. 7 *146
Typical ends of commercial helical springs. (Ref. Bk. Sheets)....Apr. 8 *143
Squares—Instrumaster Industries T-Square Nov. 18 *158
Is that square square? A. A. Sinisi May 20 *120
Stacking box—Palmer-Shile.....Nov. 18 *156
Stairway lift—Moto-Flow Stair Levayor Dec. 30 *144

Stampings:
Acromark double serial number stamp Sept. 23 *160
Acromark fixture grip for stamping Oct. 7 *144
Curved chutes aid work ejection. H. S. Wharen .....Apr. 8 *88
How to reduce costs of thin metal stampings. W. C. Mills.....June 3 *99-106
New Method Steel Stamps multiple stamp .....Jan. 15 *148
Peerless Roll Leaf stamping press Aug. 26 *130
Stamping data (Ref. Bk. Sheets) pt. 1 July 29 *125; pts. 2 & 3 Oct. 7 *137; pts. 4 & 5 Oct. 21 *143
Stamping dies. R. F. Ball....Jan. 15 *125

Standardization:
Handling unit standardization under study .....Dec. 2—114
Screw thread standard for U. S., Great Britain and Canada.....Dec. 2—107
Standards work planned to simplify military and civilian procurement Nov. 4 *129
Standards Engineers Society organized Apr. 8—131

Stands:
Beverly Shear Mfg. shear stand Dec. 16 *156
Welding fixtures held by stand. C. W. Holmstrom .....Sept. 23 *128
Workholding stand eases brazing operations .....Dec. 16 *124
Starters—Ward Leonard Electric non-reversing starter.....Oct. 7—164
Ward Leonard solenoid-operated starter Oct. 21 *164
Statistics—Is statistical quality control of value in manufacturing? No and yes. B. D. Miller, C. W. Kennedy Sept. 9— 86
Steam Irons—Equipment modifications increase production. Rupert Le Grand June 3 *90

Steel:
Amalgamated Steel Corp. tool room specialty steel.....Feb. 12—164
Better steel devised for hubbing. A. L. Pranses .....July 29 *84
Carpenter Steel color identification of tool .....Aug. 12—160
Carpenter Steel Durimet 20 stainless steel .....Mar. 25—154
Changes in structure when hard metal articles are run together under friction .....Jan. 15 *99
Cold Metal Products bright-annealed steel .....July 29—144
Diesel bearings cast in sheet-steel flasks. C. O. Donley.....Nov. 4 *89
Dimensional instability affects design of precision equipment. F. C. Victory. pt. 1 Feb. 26 *108; pt. 2 Mar. 11 *144 pt. 3 Mar. 25 *112; pt. 4 Apr. 8 *112
General Electric brazing steel process May 20—136
Latrobe Electric Steel line....Sept. 9—172
Pressures to pierce sheet steel. E. V. Sargeant. (Ref. Bk. Sheets) pts. 1- & 2 Jan. 15 *139
Process sheet for calorizing steel. George Black (Ref. Bk. Sheets)....Nov. 4—135
Process sheet for chromising steel. George Black. (Ref. Bk. Sheets)....July 29 *123
Rapid determination of carbon content in steels. Haythorne & Payne..Nov. 18 *124
Roughen stainless before nitriding. S. Dedomenico .....Oct. 21 *96
Shipments by consuming industries 1941, 1945, 1946, 1947 (table)....Jan. 29—116
Short-run economic effects seem small in pricing change.....Sept. 9—132
Stainless steel plant opened in Massillon, Ohio .....Aug. 26 *114
Steel "technological revolution" seen near with advanced methods Sept. 9—130
Weight of steel bar for 1000 pieces. (Ref. Bk. Sheets).....Apr. 8 *141
Stockpiles—As important as "the bomb" (ed) .....June 3— 81

Stockrooms:
Compact chute rack stores motor frames. J. F. Miller.....June 17 *102
Control your tools. T. F. Dundon Nov. 18 *102
Racks and bins aid raw-material warehousing. H. G. Fristoe....Aug. 12 *116
Stock sizes grouped in bins to speed correct selection. Henry Gifford Apr. 22 *99
Fixture stop locates six parts by rotating to desired setting. Cliff Bossman .....May 6 *126
Spring stops locate short jobs. W. W. Quist .....Oct. 7 *124
Storage batteries—Gould Storage Battery charge indicator.....Dec. 30 *150
Stoves—Drill jigs speed output of stove burners. Walter Rudolph..Feb. 12 *124

Straightedges:
Herman Stone Co.....Aug. 12 *160
How to align long straightedges for gun mounts .....Sept. 23 *99
Rahn Granite Surface Plate straightedge Dec. 2—128
Straightening Device—National Machy.—used on wire.....Nov. 4 *144
Strap, serrated, and pad hold on small flanges. F. W. Duce.....Oct. 7 *123
Stresses—Dimensional instability affects design of precision equipment. F. C. Victory.....pt. 1 Feb. 26 *108; pt. 2 Mar. 11 *144; pt. 3 Mar. 25 *112; pt. 4 Apr. 8 *112
Selective shot peening extends fatigue life of propellers. Epprecht & Eberhardt .....Sept. 23 *95
Stretcher, Metal—Hufford Machine Works Nov. 4 *144
Strippers—General Cement Mfg. wire stripper .....Apr. 22—118

Studs:
Dodge rolls threads on screw machines. Rupert Le Grand.....Dec. 2 *94
Four types of stud removers. R. E. Trospect .....Mar. 11 *184
Tapping stud cleans holes. W. G. McKay .....Dec. 30 *115
Washer holds stud in small hole. James Keating .....Apr. 8 *125
Suggestion system that works to everyone's advantage. Adolph Haass....Nov. 18 *114
Surplus Property—Military to curb "plus" charges under new contract regulations .....May 20—122
Surplus machine tools now under competitive bids.....Apr. 8—131
Swaging—How and when to swage. Anderson Ashburn.....Apr. 22 *77-84
Sweeper—Tennant power sweeper with dust controller .....June 3 *152

Switches:
Allen Bradley rotating-cam limit switch Oct. 7 *158
Allen-Bradley snap switch....Mar. 25—158
Barrel switch solves conveyor problem. F. W. Scooneas.....June 3 *108
Black & Webster foot switch..Mar. 25 *156
Cook Electric Hydtrol switch...June 17 *156
Durakool mercury-switch.....Oct. 7 *162
General Electric starting switches... Nov. 4 *156
Industrial Controller pressure switch Apr. 8 *160
Microswitch cuts off drillpress as tripping lever hits button. D. P. Campbell May 6 *124
Naken Engrg. & Mfg. foot switch May 20 *152
Sangamo Electric time switch..Feb. 12 *160 July 15—156
Square D foot switch.....July 15 *156
Square D operators for snap switches May 6 *160
Synchronizer—Taber Associates.....Jan. 1 *144

T

Tables:
Bay, Inc. shelf table.....Jan. 15 *156
Chicago Tool & Engrg. indexing, cross-slide table.....Feb. 26 *140
Erwood rotary layout table.....June 3 *152
Lyon-Raymond Corp. elevating table June 3 *142
Lyon-Raymond sheet feeding tables.. Feb. 12—160, July 29 *129, Oct. 21 *154
Malnar Machine & Tool worktable July 29 *130
Pentagonal layout table saves office space. A. M. Bowers.....Nov. 18 *99
Sage Equipment ball transfer table Nov. 4 *142
Tachometers—Electric Tachometer small-sized machine.....Oct. 21 *158
Zernickow Chronometric tachometer.. June 3 *144
Tanks—Kidde dip-tank nozzle for fire protection.....June 17 *150
Tape, adhesive—Minnesota Mining & Mfg. all adhesive tape.....Sept. 23—166

Tapers:
Block bottom surface ground for inspecting tapered parts. J. H. Coyle Aug. 12 *126
Offset borning head saves time when taper turning with lathe. J. W. Rundt Feb. 12 *129
Sample taper jog gages turning of new part to identical taper. D. J. Tibbits Mar. 25 *118
Special lathes turn tapers. K. R. McKay Aug. 26 *102

Taps and Tapping:
Aro Equipment Corp. push-pull tappers Dec. 2 *136
Burg Tool Mfg. Burgmaster tapping and drilling machine.....May 6 *154
Burg Tool Mfg. Tool-Flex Neoprene-mounted tap holder.....Aug. 26 *140
Cleveland Tapping Machine lead-screw tapping machine.....June 17 *150
Commander Mfg. tapping head..Mar. 11 *206
Cross drilling and tapping machine Aug. 12 *166
Cross tapping machine.....Oct. 7 *154
Dorman Machine Tool Works tapping attachment.....Nov. 18 *158
Empire Tool floating release tap holder Dec. 16 *146
Erickson Tool Div. tap holder..Apr. 22 *120
Errington Mechanical Laboratory tapping head.....Sept. 9 *156
Foulk Mfg. tap cartridges.....July 1 *148
Holder controls tapping pressure. L. H. Bobbitt.....Feb. 26 *121
Hy-Pro-Tool multi-fluted tap....Dec. 16—148
Landis Machine collapsible tap.July 29 *134
Lassy Tool tapper and threader..Apr. 8 *158
Locke Gage tapping and drilling power unit.....Mar. 11 *210
Machine screw taps (Ref. Bk. Sheets) July 29 *127
Machining copper and its alloys. J. J. McGuinness.....May 6 *108
Magazine fixture feeds parts automatically into tapping position. G. E. Shopbell.....July 15 *127
Mechanism taps blind holes. Edward Haggert.....Aug. 12 *128
Miniature tapping hand tool made from aircraft actuator. D. P. Campbell Aug. 26 *108
National Automatic tapping and drilling machine.....May 20 *146
National Automatic Tool tappers.July 29 *129
National Automatic Tool way-type machine.....Dec. 30 *140
Precision tapping handled on arbor press. Joe Manius.....Oct. 7 *123
Precision taps flute-sharpened for close tolerances. Stanley Lovejoy..Mar. 11 *133
Sheffield Corp. ground taps....May 6—156
Simple guide starts hand tap perpendicular to work surface. John Beyen Feb. 26 *121
Smaller drill used when tapping reduces aluminum thread jamming. Rogers Isetts.....Mar. 25 *122
Tap locater halts breakage. Charles Muscato.....July 29 *109
Tapping clutch prevents jams. R. E. Mills.....Aug. 26 *109
Wickman Mfg. Jay-Dee tapping attachment.....Nov. 18 *148
Templets—Flexible Template templet for layout work .....Oct. 21 *148
Light shows follower contact. Earl Goodman.....Jan. 1 *107

Testers:
American Machine & Metals testing machine.....Feb. 26 *146
City Steel Testing Machines tube tester Oct. 7 *150
Clark Instrument hardness tester.July 29 *136
General Electric oven temperature tester.....Nov. 18 *160
Hunter Pressed Steel load tester Oct. 7 *146
Lockwashers tested by special tools. H. Greenberg.....Jan. 15 *87
National Broach & Machine Red Ring gear tester.....Mar. 11 *220
Scherr Parkinson gear tester....Jan. 1 *136
Snyder Tool & Engrg. automotive cylinder head tester.....May 6 *146
Steel City Testing Machines Brinell model.....Feb. 12 *158
Taber Instrument abraser standard testing set.....Dec. 30 *132
Thermistors—General Electric.....June 3 *158
Thermocouple line—Industrial Instrument Service.....Jan. 1—138
Thin metal—Sheet metal held flat in telescoping vise insert. C. D. Mackinnon Jan. 1 *105

(*) Illustrated (ed) Editorial

Thin metal stampings—How to reduce costs of thin metal stampings. W. C. Mills June 3 *99-106
Thin shells ejected by air gun. Charles Schwartz....Nov. 4 *123

Threading:
Accurate multiple threads cut by using vernier on compound. Everett Odell Apr. 22—100, May *125
British tests indicate superiority of rolled threads....Aug. 12—186C
Broad-tap cuts quintuple threads. H. S. Wharen....Apr. 22 *69
Brown & Sharpe Mfg. screw-threading machine....Jan. 1 *130
Copper and its alloys—thread chasing May 6 *105
Cross four station thread milling machine....Apr. 8 *148
Dodge rolls threads on screw machines. Rupert Le Grand....Dec. 2 *94
How to turn non-standard threads. E. L. Schlage....Feb. 12 *95
Lassy Tool threader and tapper..Apr. 8 *158
Lathe dog grips threads. John Homewood....June 17 *128
Lees-Bradner Sentinel Cri-Dan machine....Apr. 22 *114
No. 27 threads....Dec. 30— 82
Prutton Machy. & Tool thread-rolling machine....Nov. 18 *162
Reversed button-die setup threads shouldered studs. H. W. Cutting Oct. 21 *128
Scherr thread generating machine Dec. 16 *146
Smaller drill used when tapping reduces aluminum thread jamming. Roger Isetts....Mar. 25 *122
Stripped threads. Donald Campbell Jan. 15 *124
Tapered thread cut with bar and roller. K. W. Thompson....Oct. 21 *126
Tapping stud cleans holes. W. G. McKay Dec. 30 *115
Thread depth checked on lathe with sharply pointed toolbit. Frederico Strasser....July 15 *127
Threads rolled in screw machines. C. R. Morgan....July 15 *116
Turret hookup reduced load on small threading diehead. R. E. Mills Aug. 12 *130
Work loaders applied to machine tools. Rupert Le Grand....Mar. 11 *160
Worm generation added to screw-machine cycle....Aug. 26 *101
Time and Motion Study—Chronocyclegraph sells motion study....Sept. 23—107

Timers:
Cutler-Hammer pneumatic timer.... Sept. 9 *170
Hufford Machine Works "Mechanical Brain" timer....Nov. 4 *160
Photoswitch electronic timer....June 3 *142
Weltronic combination relay timers Oct. 7 *156
Tool Engineers Industrial Exposition—Cleveland, 1948..Mar. 11 *127, Apr. 8 *127
Tool tray—Winslow Product Engrg. tray and rack....Mar. 25—152

Toolholders:
Block clamps boring bar. Ray Cafiero Nov. 4 *122
Dovetail forming tool holders (Ref. Bk. Sheets)....Dec. 2 *119
Holder positions dies straight for serial numbers and letters. A. B. Nixon May 6 *123
Maxwell automatic recessing toolholders June 17 *154
Swages tubes hold handles. Robert Brown....Dec. 2 *104
Toolholder stops chatter. G. W. Wilson Nov. 4 *121
Toolholder suitable for both left and right hand operation. Frank Lovejoy .Oct. 21 *127

Tools:
Aircraft Marine Products solderless wiring hand tools....Oct. 21—162
Chicago Pneumatic Super Cycle line of tools....Mar. 11—205
Continental Motors Multi-Tool..July 29 *132
EMCO Enterprises pick-up tool..Oct. 7 *148
Kennametal heavy duty tools..Dec. 16 *150
Kennametal, Inc. line of tools....Dec. 2 *134
Kennametal small tools....Nov. 18 *164
Tracers—Physicists Research Profilimeter Apr. 8 *158
Physicists Research tracer for measuring surface roughness....Dec. 30 *138

Tractors:
Allis-Chalmers shop shots....Aug. 12 *118
Mercury Mfg. electric tractor..July 1 *134
Rear-mounted engine on Allis-Chalmers model....Aug. 26 *113
Stilts stretch radials to fit. B. C. Brosheer....Aug. 12 *93
Transfer Machines—Motch & Merryweather Machinery....July 15 *144
Transfer machine works in duplicate..Aug. 12 *122
Transmission—Transmission gear-shift housing produced faster on automatic transfer machine....Aug. 12 *122
Trolley coaches assembled utilizing aircraft fixtures. S. C. Klein....Sept. 9 *88

Trucks:
Automatic Transportation Dual Lift truck....Apr. 22 *132
Automatic Transportation Skylift Brawny truck....Jan. 15 *158
Automatic Transportation Transtacker July 29 *138
Baker-Raulang fork truck....Dec. 2 *128
Bell Aircraft Corp. 3-wheeled truck Mar. 25 *144
Clark Equipment Clipper fork trucks Mar. 11 *230
Clark Equipment foot control for trucks Sept. 9—175
Clark Equipment Yardlift truck..Aug. 12 *160
Elwell-Parker truck sheet handler attachment....Feb. 26 *142
Globe Duo-Thrust wheel....Nov. 4 *154
How the Jeep donned civvies. D. G. Roos....Jan. 1 *69
Hyster Load-Grab truck attachment July 15 *148
Lewis-Shepard Products electric fork truck....July 29 *138
Lewis-Shepard Products JackStacker truck....Mar. 25 *148
Lewis-Shepard Products overhead truck guard....Sept. 9 *156
Lewis-Shepard Products self dumping hopper truck attachment....May 6 *141
Lyon-Raymond die-handling truck.. Dec. 2 *136
Lyon-Raymond Corp. high lift truck Jan. 1 *142
Lyon-Raymond lift truck....Feb. 12 *160
Lyon-Raymond pallet truck....June 3 *152
Lyon-Raymond Tote-Pan truck..Feb. 12 *152
Magnesium tote trucks at Worcester Pressed Steel....June 17 *91
Market Forge Load-Mobile lift truck Aug. 12 *162
Mercury Mfg. trailer truck....May 20 *134
Mixermobile Mfrs. Wagnermobile Lift truck....Jan. 1 *132
Moto-Truc Walkie truck....July 29 *130
Palmer-Shile hand truck....Dec. 30 *138
Sallinger-Sherman Jack-O-Might truck Feb. 12 *151
Shop carts carry all the tools. A. B. McCrea....June 17 *110
Telescopic jackstacker....Nov. 18 *162
Tract-R-Lift fork truck....Nov. 4 *148
Trucking eased with drag-chain conveyors. B. S. Brosheer....July 29 *102
Truckman, Inc. pallet handling truck Aug. 26 *136
Yale & Towne fork truck....June 3 *154
Yale & Towne Mfg. platform truck June 17 *156
Yale & Towne Mfg. tilting trucks.... Apr. 22—140, Oct. 7 *150
Yale & Towne Mfg. Worksaver truck May 20 *146

Tubing:
Bender cold-reduces tubing. S. Framurz Nov. 18 *130
Bull center grips end of stock for cutting collars from tube. A. B. Nixon May 20 *119
Federal Machine & Welder form tubing Dec. 2—123
Flodar Corp. Grip Tube fitting....Jan. 1 *144
Gordon thermocouple protecting tube Jan. 15 *160
Manual "armbreaker" turning grooves tube-bending forms. F. J. Zarnowski Sept. 9 *124
National Bureau of Standards announce that tubing is covered by simplified practices....July 15—115
Pannier Bros. Master Marker tubing June 3 *140
Penaflex Sales Ronaflex tubing..Jan. 1—144
Pin gage aids tube measurement by holding dimension for check. M. H. Ball Apr. 8 *125
Ronaflex Tubing synthetic body tubing June 3 *156
Rules for upsetting tubing (Ref. Bk. Sheets)....Jan. 1 *125
Scovill Mfg. self-flaring tube fitting Nov. 18 *178
Seamwelding extension mandrel simplifies tube joining. Thomas Kent..Oct. 7 *122
Sturdimatic Tool live centers for tubing June 17 *148
Unger Mfg. tube-cutting machine... May 20 *146
Unusual protractor sets angles on ends of bar stock and tubing. M. R. Hammond....July 15 *126
Turbines—Universal Engraving & Colorplate Pant-O-Jector gage checks turbine blades....Mar. 25 *140
Turntables—Drill tables form mobile bench Aug. 12 *127

U

Ultrasonics—Photocon Research Product Metroscope....Sept. 9*146
Underground plants — Semi-underground plant in Springfield....Sept. 9—113

V

Vacuum Cleaners:
Mechanizing cleaner manufacture ups output, saves floor space. A. F. Murray May 20 *110
Printing replaces hand filling of embossed surfaces. H. O. Bates..Apr. 22 *89
Shop shots of Electrolux....June 17 *96

Valves:
Adel Precision Products selector valve May 20 *150
Airmatic Valve....Feb. 26 *154
Airmatic Valve hand and foot controlled valves....June 3 *154
Airmatic Valve Model DS-2 solenoid valve....July 15 *156
Carpenter Mfg. Bulldog needle valve July 1 *148
Compound die and punch plate reduces operations from six to one. J. J. McGuinness....May 10 *106
Crescent Valve Solenoid-controlled valve July 15 *154
Electrol 4-way selector valve....July 1 *148
Electrol selector valve....Oct. 21 *172
Galland-Henning Mfg. Flo-Trol De Luxe valves....Apr. 8 *162
Gerotor May Corp. relief valve..Dec. 16 *164
Greer Hydraulics shutoff valve..June 3 *154
Hanna Engrg. solenoid valves...Oct. 7 *166
Hannafin Corp. electric air control valves Mar. 11 *224
Hannifin Corp. regulating valve. Mar. 25 *154
Hunt Quick-as-Wink valve....Apr. 22 *113
Linde Air Products dual shutoff station valve....Apr. 8 *158
Logansport Machine foot-operated valve May 20 *152
Mead Specialties 3-way air valve Dec. 16 *162
Modernair Corp. 4-way control valve Oct. 21 *164
Numatics valve air cylinder control Aug. 26 *140
Oil-Rite Corp. Style SFX for feed valves....Apr. 8—162
Paul Valve Corp. packless air valve Dec. 16 *165
Pneu-trol Devices control valve. Mar. 25 *154
Reeves Pulley rotary valve....Dec. 2 *138
Resistance welder makes cutoff machine for valve stems. Lester Tingley Aug. 12 *120
Titeflex lubricator valve....Aug. 26 *144
Valley Tool four-way valve....Sept. 9 *174
Valve-stem guides finish ground automatically. R. R. Coulette....June 17 *125
Viking Products ring-seal air valves Dec. 30 *156
Vibration—Damped quill stops self-excited chatter. E. J. Tangerman....May 6 *93
Vibrometers—General Electric recording vibrometer....Nov. 18 *162

Vises:
Auxiliary slanted vise jaw holds casting with draft. L. A. Springle..Aug. 26 *110
Auxiliary vise clamp prevents slipping during heavy cuts. N. A. Malmgren Jan. 1 *107
Bellows DVH-150 air hydraulic vise Aug. 12 *160
Chicago Tool & Engrg. Palmgren vises July 29 *144
Cut-out bench vise clamps round stock and weld work. C. H. Willey..July 29 *110
Dery Tool & Die equalizing vise gang Apr. 22 *126
Deublin jig vise clamps....Apr. 8 *156
Double-acting screw on vise fixture centers forged links for drilling. C. T. Bower....Nov. 4 *120
Erwood drillpress vise and milling machine....Sept. 9 *166
Extra vise jaws hold small work. Gerhard Wenke....Mar. 25 *122
Hartmann Mfg. bench vise....Mar. 11 *212
Hartmann Mfg. drillpress vise..Mar. 11 *220
Hartmann Mfg. Jawset vises...Dec. 2 *140
Improved vise grips thin stock with tongue-in-slot jaw blocks. C. T. Bower Apr. 22 *99
Jigs and fixtures at low cost. E. J. Weirstall....Sept. 23 *126
Knurled cam and rack built into quick-acting machine shop vise. A. B. Nixon June 17 *128
Master bases cut fixture costs. Herman Goldberg....Dec. 2 *83-90

(*) Illustrated (ed) Editorial

Midget vise clamps small die work. C. T. Bower....Dec. 16 *123
National Bureau of Standards announces that vises are covered by simplified practices....July 15—115
North Bros. Mfg. angle vises....July 29 *142
Nutmeg Tool & Products double-cam actuated vise....June 17 *160
Production Devices Airlox Senior Model vise....Oct. 21 *166
Producto Machine self-centering vise June 17 *158
Quick-acting fixture closes jig with pressure on collar handles. H. Moore Feb. 26 *120
Rubber jaws hold many pieces. A. F. Scoblic....Jan. 1 *105
Sheet metal held flat in telescoping vise insert. C. D. Mackinnon....Jan. 1 *105
Van Products Vi-Speed vise...Feb. 12—154
Vise changes expand utility. Chandler Phillips....Oct. 7 *122
Vitallium alloy can be drilled and milled with carbide cutters. Jesse Sdano Nov. 18 *96
Vocational adjustment affected by family status. Stockford & Kunze....Oct. 7 *85

W

Wages—see Labor

Washers:
Double punch blanks and pierces straight-sided rubber washers. Joseph Budnick Dec. 16 *121
Drill-block feed cools cutoff. J. J. Moffatt Feb. 26 *117
Garrett spring-lock washer....Feb. 12—166
Lockwashers tested by special tools. H. Greenberg....Jan. 15 *87
Standard Locknut & Lockwasher X-washers....June 3—160
Washer holds stud in small hole. James Keating....Apr. 8 *125
Washing Machines—Launderall washing machines output increased by improved materials handling. B. V. Eastman June 17 *104
Watches—Bright hardening and tempering tiny parts. Hovis & Marks.... pt. 1 Feb. 12 *91; pt. 2 Feb. 26 *112
How watch movements are measured Jan. 1—160
Water unloader—Shelburne—removes oil and water from air-compressor tank.... July 15 *156
Wattmeter—General Electric photoelectric wattmeter....June 3 *152
Waxes—Centrifugal process improves investment castings. V. S. Lazzara. Aug. 26 *93
Precision investment castings improved by foundry methods. K. R. Geist June 3 *83
Wear resistance measured in laboratory and shop. Prof. Dr. Ing. N. N. Sawin May 20 *98
Weight tables for screw-machine products (Ref. Bk. Sheets) pts. 1, 2 & 3 Dec. 16 *135

Welding:
ACF welds hopper cars....July 29 *116
Aluminum welding....July 1 *96
Carbon blocks simplify welding jobs. Phil Glanzer....Oct. 21 *124
Carrousel conveyor assemblies and welds large dispenser drums....Dec. 30 *80
Defects in aluminum alloy spot-welds. C. R. Dixon....June 17 *98
How to use helium-shielded arc welding. H. O. Jones....Nov. 4 *101-116
How to weld zinc-base die castings. Larry Phillips....Dec. 7 *72
Inert-gas shielded-arc welding broadens its applications. Jones & Huff, Jr. Mar. 25 *92
Manual hidden arc welds hoist cylinders 300% faster. Al Blewett....July 1 *106
New welding arm spots holding strips. T. E. Tyler....Dec. 16 *122
Resistance welding of stoves simplified by precision jigs. Walter Rudolph July 1 *82
Seamwelding extension mandrel simplifies tube joining. Thomas Kent....Oct. 7 *122
Shop shots at Kalamazoo Stove. Aug. 26 *98

Welding Equipment:
Acme Electric Welder projection welder Nov. 18 *162
Agnew Electric butt welder....Feb. 12 *160
Agnew Electric one-piece spark plug for welding on hydraulic machine. June 3 *142
Agnew Electric pivot-type spot welder Mar. 25 *152
Air Reduction Sales arc-welding electrode May 6 *141
Air Reduction Sales Heliweld holder Feb. 26 *142
Air Reduction Sales welding torch Apr. 8—148
American Optical hand shield for welding jobs....Oct. 7 *144
Ampco Metal bronze wire for welding Sept. 9—170
Ampco Metal holder for spot welder tips Oct. 7 *160
Automatic Transportation welding equipment truck....Oct. 21 *152
Clearing Machine spot-welding press Sept. 9 *158
DoAll Co. flash welder....Dec. 2 *132
du Mont Corp. Minute Man welding positioner....July 29 *138
Electric Arc, Inc., portable arc welder June 17 *160
Electric Arc spotwelder....Dec. 2 *126
Eutectic Welding Alloys Corp. Eutrerod rods....Jan. 1—142; Jan. 15—154; Sept. 23—154; Nov. 4—152
Federal Machine & Welder cylinder-forming seam welder....July 1 *133
Federal Machine & Welder machine Jan. 1 *140
Federal Machine & Welder multiple-spot welder....July 1 *142
Federal Machine & Welder projection welder....July 15 *150
Foster Mfg. welding units....June 17 *158
General Electric lightweight DC welder Nov. 4 *154
Glenn-Roberts AC welders....Dec. 30 *146
Glenn-Roberts Correct Arc inert gas welding....Jan. 15 *156
Graham Mfg. stud welder....Nov. 18 *166
Greyhound A.C. Arc Welder Corp. spot welder....June 17 *148
Hamilton Tool welding and cutting torch July 29—140
Harnischfeger Corp. portable arc welder Jan. 1 *136
Hobart Bros. welding attachment stabilizer....Oct. 7 *142; Oct. 21 *166
Kern D.C.-A.C. welders....Aug. 12 *160
Kern arc welders....Feb. 26 *152
Lincoln Electric Manual Lincolnweld for semi-automatic welding....July 1—136
Lincoln Electric portable welder. July 15 *144
Lincoln Electric welding torch. Apr. 22 *126
Linde Air Products Unionmelt flexible welder....Feb. 12 *156
Linde Air Products Unionmelt shaping machine....June 3 *142
Liquid Carbonic welding torch. Mar. 25 *148
Liquid Carbonic Corp. welding torch cutter....Mar. 25 *150
Mallory ejector type holder for resistance welding....July 15—152
Metal & Thermit Corp. arc welders Nov. 18 *160
Mid-States Equipment arc welders.... June 3 *150
National Cylinder Gas Sureweld welder....Nov. 18 *164
Progressive Welder air-operated rocker-arm welders....Aug. 26 *130
Progressive Welder seam welders.... Sept. 23 *160
Progressive Welder spot-welding guns June 17 *147
Resistance welder makes cutoff machine. Lester Tingley....Aug. 12 *120
Safety with oxyacetylene gas. Phil Glanzer....May 20 *115
Sciaky Bros. spot welders....Feb. 26 *139
Sciaky Bros. welding unit....Sept. 23 *152
Square D welding controller....Oct. 7 *150
Stand holds three welding fixtures. C. W. Holmstrom....Sept. 23 *128
Taylor-Winfield press welder. Apr. 22 *126
Taylor-Winfield projection welder.... Mar. 25 *150
Taylor-Winfield Corp. Tri-Phase welders....Sept. 9 *154
Thomson Electric Welder system. Dec. 30 *132
Tri-Arc Corp. welding unit....May 6 *152
Trindl Products general purpose welder....Jan. 1 *142
Tweezer-Weld Corp. welder....Jan. 15 *150
Weldex bench type spotwelder. Sept. 23 *158
Weldit, Inc. welding and heating torch Sept. 9 *162
Weltronic welding controller...Oct. 21 *174
Westinghouse Electric spot light for welding....Apr. 8—152
Westinghouse Electric Weldomatic welder....Feb. 26 *152
Western Manufacturers Association organized....Nov. 4—125
Wheelbarrow, motorized, roll through straight-line layout. Arthur Hess.... Nov. 18 *118
Wheels—Aerol water-tight industrial wheel July 15 *148
Winder—Globe Tool & Engrg. armature winder....Aug. 12 *162
Wire ropes—Palmer-Shile wire rope sling Nov. 18 *152

Wires:
Metallizing Engineering wire control and straightener....Dec. 16—158
Side-cutting shaper tool clips wire lengths in gaging fixture....July 1 *116
Wire, machines and processes mean better cold headed brass. W. D. France Feb. 12 *96
Worcester Pressed Steel—tooling techniques. E. J. Tangerman....June 17 *91

Wrenches:
Black & Decker Mfg. impact wrench Dec. 30 *140
Dayton Rogers Mfg. die cut wrenches Dec. 2—134
Keller Tool impact wrench....Mar. 11 *228
Plomb Tool wrench handle....May 20 *134
Reed Roller Bit Cleco impact wrench Oct. 21 *158
Socket head forms box wrench. O. S. Wretley....Nov. 4 *124
Socket ratchet twists tap wrench. E. E. Walker....Mar. 25 *122

X

X-rays—Largest x-ray lab. dedicated at Milwaukee....Oct. 7 *129

Z

Zinc—Process sheet for zinc-immersion treatment. George Black (Ref. Bk. Sheets)....July 15 *135
Zinc electroplating. George Black (Ref. Bk. Sheets)....July 1—127

(*) Illustrated (ed) Editorial

AUTHOR'S INDEX

ABEL, ERNEST F. Centering fixture aligns shafts for keyseating...Dec. 2 *104
Abner, Henry L. Should suggestions be screened?.....Sept. 9—182
Adams, E. C. How to sell the government Aug. 12—146
Adams, William A. Angle ground on 6-in. scale forms tool for gaging slots... June 17 *127
A'Hearn, F. M. Baffled ladle lid skims dross and saves metal.....Jan. 15 *123
Coddle or cull?.....Feb. 12—170
Expert or executive?.....Jan. 29—338
Long-remembered lesson.....June 3—169
Study it or do it?.....Jan. 15—164
Ahner, Henry L. Mathematical formula locates idler in offset gear-pinion mechanism.....June 17 *126
Aimers, Francis. Spatter mix nixes scale Nov. 4—124
Alban, C. F. Conveyor furnace anneals bimetal strips.....Sept. 23 *108
Alexander, Robert S. Deadline or dead time?.....Aug. 12—185
Do morals affect morale?.....Sept. 23—174
Does a raise raise output?....June 17—182
Ease in or break in?.....July 1—152
Guards or production?.....Feb. 26—170
Is too good too bad?.....Apr. 8—170
Step down or step out?.....Mar. 11—239
Allen, George C. Fly-cutters are set progressively to distribute cutting load evenly.....Feb. 26 *117
Allen, W. E. Screw-machine form-tool step protects carbide-tool insert....June 3 *121
Alter, L. W. Scott. Responsibility of machine tool distributor to machine tool builder.....Aug. 12—145
Amick, C. L. & L. R. Keiffer. Test your own fluorescents.....July 29 *80
Anderson, Don E. Drill-rod reamer finishes holes.....Mar. 11 *184
Anderson, Edward E. Capscrews form flexible joint for limited movement of links.....Mar. 25 *119
Ashburn, Anderson. How and when to swage.....Apr. 22 *77
How to work aluminum and its alloys July 1 *85
Modern industrial safety equipment Oct. 7 *101
1-oz. binocular shell machined to close tolerances.....July 15 *89
Astley, B. P. Minimum hub diameters.. Dec. 30 *129
Axler, Michael. Do morals affect morale? Sept. 23—174
Drills ground in lathe spindle..Nov. 18—128
Ease in or break in?.....June 17—184
Guards or production?.....Apr. 22—144

BABIN, ED. Cup wheel surfaces snap gages by getting inside deep throat Apr. 8 *123
Ball, Harry R. Contour grinding work fed by bar and cam mechanisms...May 6 *123
Ball, Martin H. Auxiliary machine adjustment finds lost shaper motion Sept. 9 *127
Pin gage aids tube measurement by holding dimension for check..Apr. 8 *125
Ring-and-clevis setup clamps chuck jaws for end grinding.....Sept. 23 *133
Small thrust collars save shaft space Jan. 1 *108
Ball, Raymond F. Stamping dies..Jan. 15 *123
Ball, W. S. Sleeve holds heated rollers snug against tapered mandrel..Oct. 7 *122
Barrett, Louis. Hard facing improves tool life.....Apr. 8 *94
Bates, H. O. Printing replaces hand filling of embossed surfaces..Apr. 22 *89; May 20—109
Baulieu, Wm. E. & others. How to finish copper and copper alloys....Feb. 26 *95
Beam, E. C. What to watch in metal-polishing costs.....Aug. 12 *87
Becherer, Robert C. Conveyors, chutes and hoists mechanize chip handling..Sept. 9 *120
Belfit, R. W. & others. How to finish copper and copper alloys.....Feb. 26 *95
Bergman, J. W. New applications for subtractive-lead hobbing.....July 15—117
Bergmann, R. H. Key clamps grooving tool Oct. 21 *130
Bergstrom, Swan E. Sales strategy..Aug. 12—144
Berndt, Henry G. Bayonet chuck..Jan. 1 *108
Beyen, John. Simple guide starts hand tap perpendicular to work surface..Feb. 26 *121
Birrell, D. M. Brazing holds drill extension Mar. 25 *119
Black, George. Process sheets
Anodizing aluminum-alumilite sulfuric-acid method.....June 17 *141
Brush electroplating.....Aug. 12—149
Cadmium plating.....Feb. 12—145
Chrome-pickle treatment.....Oct. 21*141
Copper plating.....Sept. 9 *139
Chromising steel.....July 29 *123
Decorative chromium plating..Mar. 11 *203
Dichromate treatment of magnesium May 6 *135
Indium plating.....May 6 *139
Industrial chromium plating....Oct. 7 *135
Rhodium plating.....Dec. 2 *117
Sodium hydride descaling.....Dec. 30 *127
Zinc-immersion treatment.....July 15 *135
Zinc electroplating.....July 1—127
Blackham, William E. Bearings prevent stock marking in lathe steadyrest installation.....Mar. 25 *121
Blakeman, Abel. Boss . . . and bust? Aug. 26—154
Does a raise raise output?.....Apr. 8—172
Gambling on the long green....Nov. 4—177
Guards or production.....Apr. 8—166
Is blue Monday inevitable?....Aug. 12—182
Learn or earn?.....Jan. 29—3 8
Present or bribe?.....Sept. 23—184
Single-track or double-track mind? Oct. 7—174
Study it or do it?.....Jan. 15—168
Who hires the boss?.....July 15—168
Blanchard, E. Payson. Selecting the equipment to be offered.....Aug. 12—138
Blewett, Al. Manual bidden arc welds hoist cylinders 300% faster.....July 1 *106
Bliven, C. E. Lathe cuts keyways..Jan. 15 *125
Bludeau, R. E. Liquid nitrogen simplifies bearing assembly.....Dec. 16 *82
Bobbitt, Luther H. Holder controls tapping pressure.....Feb. 26 *121
Bolton, James F. Fixture winds special springs.....Apr. 8 *122
Bonness, Paul. Automatic assembly jumps output 47 times.....May 6 *96
Tricky tooling cuts relay costs..Jan. 1 *93
Bormann, Hans. Replaceable die handles small work.....Aug. 26 *112
Bossman, Cliff. Fixture stop locates six parts by rotating in desired setting..May 6 *126
Bower, Clifford T. Do morals affect morale? Oct. 7—181
Double-acting screw on vise fixture centers forged links for drilling..Nov. 4 *120
Dressing attachment crush-forms to true grinding wheel surface.....July 1 *112
Geared disk-cam holder matches feed and rotation for milling.....July 29 *110
Guards or production?.....May 6—166
Improved vise grips thin stock with tongue-in-slot jaw blocks....Apr. 22 *99
Midget vise clamps small die work Dec. 16 *123
Pantograph leg linkage adapts special compass for blueprinting.....Nov. 18 *127
Semi-automatic device speeds production of short dowel pins.....July 15 *124
Tool fixture produces spherical holes using locomotive principle..Feb. 12 *130
Vernier caliper measures radii of partial sections.....Dec. 2 *105
Bowers, A. M. Pentagonal layout table saves office space.....Nov. 18 *99
Branders, Hans. How carbide tools are handled in Finland.....Aug. 12 *96
Braun, William. Air blast controls cooling, aids cutter run-out check....Aug. 26 *111
Brechter, Frederick A. Sales presentation to a group.....Aug. 12—139
Brockman, B. N. Selling tools.....Aug. 12—144
Brophy, John E. Large radius arcs cut on mill.....Mar. 11 *187
Brosheer, B. C. Chain and belt conveyors handle die-cast products.....June 17 *116
A handbook of horizontal broaching fixtures.....Dec. 16 *93
Hotpoint mechanizes range production Dec. 30 *67
How smooth is smooth? pt 1 Sept. 9 *97 pt. 2 Sept. 23 *111
Special tools bore aluminum castings at high speed .....Aug. 12 *90
Stilts stretch radial to fit.....Aug. 12 *93
Trucking eased with drag chain conveyors July 29 *102
Vertical surface-broaching fixtures..... pt. 1 Jan. 1 *77; pt. 2 Jan. 15 *101
Brown, George W. Internal collet grips turnings for close concentric machining.....Feb. 26 *118
Brown, John. Latch raises profiling tool for clearance on planer job....Aug. 26 *110
Brown, Robert. Swaged tubes hold handles Dec. 2 *104
Browning, F. E. Comparator chart layout checks involute gears.....May 20 *89
Budnick, Joseph F. Cam-locking, delayed-action die force fits ball handle on upstroke.....Sept. 9 *124
Double punch blanks and pierces straight-sided rubber washers.....Dec. 16 *121
Drillpress made automatic by motor-driven attachment.....May 6 *128
Tandem press loader uses air cylinder Jan. 1 *104
Budwitz, Peter L. Ease in or break in? June 3—169
Prospecting.....Nov. 4—177

CAFFIERO, RAY. Block clamps boring bar.....Nov. 4 *122
Depth gage and ground block measure curved-surface radii.....Sept. 23 *134
Cameron, David. Single-track or double-track mind?.....Sept. 9—185
Cameron, Don. Paraffin "freezes" ball bearing for minor i.d. or o.d. grinding Mar. 25 *120
Campbell, Bernard D. Stud and setscrew bind inside fixture handle.....Nov. 4 *124
Toggle clamp fits in T-slot.....Dec. 2 *106
Campbell, Donald. Coolant pipe guide Feb. 12 *133
Magnet stand holds oil supply to coal jobs on small machines....Aug. 12 *127
Miniature tapping hand tool made from aircraft actuator.....Aug. 26 *109
Plate shows feeds and speeds..Sept. 9 *127
Practical ideas .....May 6 *124
Squaring gage indicates incline from vertical with dial readings..Mar. 25 *121
Stripped threads .....Jan. 15 *124
Caple, George E. Ball bearing and drill shank clamp disks in thrust setup Sept. 9 *128
Cederberg, C. W. Scrap, properly handled, brings a premium.....June 3— 98
Chase, Herbert. Forging the impossible July 15 *114
Cheek, Lewis F. Procedure for finishing shoulders gives quick and accurate results.....Mar. 25 *119
Templet-and-follower setup improved—simplified version.....June 3 *120
Childs, H. Sine plate hinged to base to support work on grinder.....May 6 *126
Chrosniak, Robert J. Tool burrs small hidden holes.....Feb. 12 *129
Clark, Allan F. Cost cutting milling setups Nov. 4— 94
Clark, Jay M. Rocker arm actuates bore checker.....Nov. 4 *121
Clark, M. C. Personal qualifications for builders' salesmen.....Aug. 12—178
Clarke, Allan. Snap-gages are shop-produced with hard, dowel-pin anvils..July 15 *125
Clarke, Fay E. Azimuth plate rechecks dividing.....Jan. 1 *104
Clarke, Harry. Guards or protection? July 29—150
Trouble shooter or trouble maker? May 20—162
Cornell, Sidney. How gear shaving works June 3 *94
Cottrell, G. H. Skinner disks produced faster by spinning.....Aug. 26 *78
Coulette, R. R. Valve-stem guides finish ground automatically.....June 17 *125
Court, L. W. Hydraulic units power machine elements.....Aug. 12 *83
Coyle, John H. Block bottom surface ground for inspecting tapered parts Aug. 12 *126
Crain, Philip. Sine bar dresses measured angles on outside grinding-wheel edges July 1 *114
Cullitan, Frank T. Ball setup laps center Dec. 2 *103
Curcio, Milton J. Simple arbor sets up drill for grinding shank.....July 1 *112
Cutting, Harold W. Auxiliary nose prevents damage to spindle of surface grinder Oct. 7 *124
Eccentric pins level work on cylinder grinder.....Dec. 16 *122
Reversed button-die setup threads shouldered studs.....Oct. 21 *128
Scale tool locates bolt circle...Nov. 18 *128
Cuyler, J. Milling machine column pointer resets table height.....Jan. 1 *106
Wall of small tubing gaged with micrometer attachment.....June 3 *120

DASCHKE, GEORGE F. & HAROLD LAWSON. How Packard whips tough forging jobs .....July 29 *73
Dav, C. Denson. The written word..Aug. 12—145
Dedomenico, S. Roughen stainless before nitriding.....Oct. 21 *96

(*) Illustrated (ed) Editorial

De Heer, Howard. Dowel aids square grinding....Jan. 1 *108
DeLong, H. K. Zinc film permits plating on magnesium....May 6 *98
DeMello, A. T. Fly cutter and angled setup cut elliptical holes on mill....July 15 *124
De Neve, Bruce J. Fixture checks form-tool grind....Sept. 9 *128
Denison, John S. How to deal with contract shops....Nov. 18 *100
Deresh, L. Milling-machine turns collar Oct. 21 *128
Dice, W. A. Caliper leg mounts indicator Nov. 4 *122
Dimitruk, Walter. Carbide bit has four edges....Dec. 16 *123
Good morning to you....Dec. 16—169
Diskavich, Edward. Blue devils..Oct. 21—190
Coddle or cull?....June 3—165
Gage measures deep holes with replaceable rods....Apr. 8 *123
Study it or do it?....Jan. 15—170
Who hires the boss?....July 29—158
Dixon, C. R. Defects in aluminum spot-welds....June 17 *98
Dolsen, W. F. Single-track or double-track mind?....Sept. 9—183
Donley, C. O. Diesel bearings cast in sheet-steel flasks....Nov. 4 *89
Duce, F. W. Four clamps set by tapered cams....Oct. 21 *129
Serrated strap and pad hold on short or slanted flanges....Oct. 7 *123
Dundon, T. F. Control your tools.Nov. 18 *102
Dunlap, C. Idler-gear location—discussion Aug. 12 *127
Durante, Charles. Converted chucking jaws hold bar stock securely....Mar. 11 *187

EASTMAN, B. V. Improved materials handling means more washing machines....June 17 *104
Eaton, Donald E. Pneumatic plunger in turret lathe replaces bar-feed mechanism....Oct. 21 *128
Eberhardt, H. W. & J. Epprecht. Selective shot peening extends fatigue life Sept. 25 *95
Egolf, Ralph. Bar setup on planer locates trace used for turning hourglass shape Apr. 8 *122
Eklund, Stone E. & A. H. Shum. Simplified machining produces complicated parts Dec. 2 *96
Elby, N. J. Inside threads gage checked with thread-chasing fixture....May 6 *126
Elliott, A. M. Back up or back out?.Aug. 26—148
Boss—and bust?....Sept. 9—180
Excuses or excellence?....Jan. 1—150
Expert or executive?....Jan. 29—340
Learn or earn?....Mar. 11 *232
Single-track or double-track mind? Sept. 9—184
Swapping shops....July 29—152
Who hires the boss?....Aug. 12—174
Epprecht, J. & H. W. Eberhardt. Selective shot peening extends fatigue life Sept. 23 *95
Eveleth, William T. Silicones . . . what they are and what they do..Nov. 18 *91
Everhart, John. Europe tools for extrusion Dec. 2 *67

FINNEY, BURNHAM. How to keep your employees informed....Mar. 25 *99-106
Fitsimmons, Lloyd R. Draw-cut scrapers clean up dies, deburr holes and finish patterns....Mar. 25 *121
Fonquen, F. G. Templet-and-follower fixture controls turning of spheroids Feb. 26 *119
Forquer, F. G. Mold plate gripped for lifting by internal wedging of clamp Apr. 8 *124
Framurz, S. Bender cold-reduces tubing Nov. 18 *130
Gage-block assemblies form snap and limit-snap gages precisely..Mar. 25 *117
Grinder rotary table checked by grinding of two thin bars....Feb. 12 *133
Jig disks locate drills....Sept. 23 *131
Rugged punch pinned to block..Dec. 16 *124
Strip-stock distortion stopped by punch-press methods changes....June 3 *121
Three disks set layout angles..Dec. 2 *102
Two shim blocks ease clamping..Aug. 26 *112
France, Walter D. Wire, machines and processes mean better cold headed brass Feb. 12 *96
Francis, Henry C. Learn or earn?..Jan. 29—346
Step down or step out?....Feb. 26—170
Fristoe, R. O. Racks and bins aid raw-material warehousing....Aug. 12 *116

GABRIEL, WALTER. Production with pre-parting punch makes tear-drop sheet-metal shape....Sept. 9 *126
Gaillard, John. Gage-zone system harmonizes delivery and acceptance inspection Feb. 12 *100
Galus, Henry S. Eye calisthenics....Jan. 1—107
Gates, Harold. Hand tool and belt power grinding work on centers....June 3 *118
Geimeier, H. H. Triple-acting press assembles stators....Mar. 25 *98
Geist, Kenneth R. Foundry methods improve investment casting....June 3 *85
Giebel, Robert L. What should the sales engineer know about any particular prospect?....Aug. 12—139
Gifford, Henry. Stock sizes grouped in bins to speed correct selection....Apr. 22 *99
Giles, G. C. How colloidal graphite aids metal forming....June 17—143
Gillig, Henry. Merry-go-round conveys radio-chassis assembly....Oct. 7 *90
Girardot, E. H. How to get the most out of punch presses, pt. 1 Feb. 26 *79; pt. 2 Mar. 11 *174; pt. 3 Mar. 25 *10; pt. 4 Apr. 8 *116; pt. 5 Apr. 22 *86; pt. 6 May 6 *114
Glanzer, Phil. Carbon blocks simplify welding jobs....Oct. 21 *124
Safety with gas....May 20 *115
Goldberg, Herman. Master bases cut fixture costs....Dec. 2 *83
Goodman, Earl. Light shows follower contact....Jan. 1 *107
Greenberg, H. Special tools torsion-test lockwashers correctly....Jan. 15 *87
Greuel, Harold. Rotating drillpress table speeds lapping operation....July 29 *109
Griffith, Ben H., Jr. & Ray Skiba. How to design work coils for induction heating Aug. 12 *99
Gruendler, Victor. Employees run safety program....Dec. 30 *78

HAASS, ADOLPH. How to build a workable suggestion system....Nov. 18 *114
Habicht, George Jr. Responsibility of the machine tool builder to the machine tool distributor....Aug. 12—142
Haggert, Edward. Mechanism taps blind holes....Aug. 12 *128
Halliday, W. M. Centering device locates keyways on tapered shafts....Jan. 15 *122
Hammond, Milton R. Unusual protractor sets angles on ends of bar stock and tubing....July 15 *126
Hancock, Stephen E. Two-part flat forming tools made and sharpened quicker July 29 *108
Hanley, T. H. Indicator attachment sets rough and finish diameters..Jan. 15 *120
Hanus, Joseph J. Offset angle or chamfering is found with trigonometry..Aug. 26 *108
Hardcastle, L. H. Lathe chuck holds balls Jan. 1 *107
Lead-end hammer minus handle equals useful tool....May 20 *118
Sectional piston simplifies job when replacing worn component....Feb. 26 *121
V-blocks have unlimited uses....Feb. 12 *130
Harrington, Dan. The follow-through after the sale....Aug. 12—146
Harrington, John P. Draft angle ground on cutter for milling out casting dies July 29 *112
Harris, James. How to gun-drill for fine finish....Mar. 11 *136
Harris, K. N. Are toolmakers obsolescent? Feb. 12—168
Goldberging or goldbricking?...Mar. 25—162
Work the rules or rule the works? Feb. 26—166
Hartley, F. Inspect parts speedily with gages like these....Jan. 15 *121
Hartzell, D. W. Good morning to you Dec. 16—170
Hayes, Robert B. Tooling up the job Aug. 12—142
Haythorne, P. A. & B. R. Payne, Jr. Rapid determination of carbon content in steels....Nov. 18 *124
Hebert, James C. The four fundamentals—scope of the course....Aug. 12—135
Heinlein, Leonard C. Air motors operate scroll chucks on milling fixture Aug. 26 *77
Bearing housings drilled with rail fixture June 17 *114
Henderson, W. C. Fixture locates rotor assemblies....July 15 *119
Hess, Arthur. Motorized wheelbarrows roll through straight-line layout..Nov. 18 *118
Hess, Dale E. Plug gage and gage blocks measure center-to-center....July 1 *113
Hicks, Tyler G. Chart for lineshaft calculations....Nov. 4 *137
Setscrew chuck grips odd shapes..Oct. 21 *130
Higgins, Bradley C. Portable steam generator cleans presses....July 1 *111
Hillhouse, J. W. Cracks in presses repaired quickly....Aug. 26 *73
Hird, Arthur F. Cut-away on stripper plate speeds hand feeding stock....May 20 *120
Hoag, Milton F. Quick method of calculating gear changes not listed on gearbox plate....Feb. 12 *131
Hoagland, C. R. How Harvester makes forging dies....Dec. 2 *78
Holman, George. V-block guides punch and drill for shaft layout and machining Apr. 22 *98
Holmquist, John T. Light gage checks recess....Dec. 30 *116
Holstrom, C. W. Stand holds three welding fixtures....Sept. 23 *128
Homewood, Charles. Center set equips standard lathe....Nov. 4 *123
Universal chuck tips....Dec. 2—106
Homewood, John. Back up or back out? July 15—172
Blue devils....Oct. 21—186
Boss—and bust?....Sept. 9—179
Deadline or dead time?....Sept. 9—178
Do morals affect morale? Sept. 9—187; Oct. 7—182
Ease in or break in?....July 1—150
Is blue Monday inevitable?....Aug. 26—150
Lathe dog grips threads....June 17 *128
Present or bribe? Sept. 21—182, Dec. 30—161
Should suggestions be screened?.Sept. 23—170
Swapping shops....Nov. 20—170
Timekillers I have known....Jan. 29—332
Who hires the boss?....Aug. 12—172
Hovis, Harry L. & A. W. Marks. Bright hardening and tempering tiny parts pt. 1 Feb. 12 *91; pt. 2 Feb. 26 *112
Hudson, Frank C. Back up or back out? July 29—158
Huff, H. A. Jr. & H. O. Jones. Inert-gas shielded-arc welding broadens its applications....Mar. 25 *92

INGALLS, NORMAN. Dividers make layout from hole as bearing ball locates center....Apr. 8 *124
Isetts, Roger. Automatic pencil aids compass for colored-line layout work.. Mar. 25—119
Capped knockout takes die shock..July 1 *115
Die spring deflects under heavy shearing side load....Oct. 7 *120
Ground screw cleans die holes May 20 *118
Painting cuts heat-treat scale....July 1—112
Slotting replaces broaching in end of boring bar....Dec. 2 *106
Smaller drill used when tapping reduces aluminum thread jamming....Mar. 25—122

JAMES, P. E. Boss—and bust?..Nov. 18—180
Is blue Monday inevitable?....Oct. 21—184
Should suggestions be screened?.Dec. 30—160
Who hires the boss?....Oct. 7—172
Jeffries, W. R. Safer ways of using die sets....Oct. 21—103
Jenkins, Murray G. Market research will help small companies....Aug. 26—104
Jessop, S. W. Horsepower for overhead chain conveyors....Dec. 30 *125
Johnson, C. A. Boss or bust?....Aug. 12—186A
Coddle or cull?....Jan. 29—336
Different tool-point widths for milling worn....May 20—117
Face-to-face—or back-to-back...Dec. 30—162
Form-tool discussion....Dec. 30—116
Prospecting....Nov. 18—184
Should suggestions be screened?.Aug. 26—158
Step down or step out?....Mar. 11—238
Thread measurements....Dec. 2—106
Too good....Dec. 2—156
Johnson, D. A. No one lifts more than 10 lb. July 29 *101
Jones, Harold O. How to use helium-shielded arc welding....Nov. 4 *101
Jones, H. O. & H. A. Huff, Jr. Inert-gas shielded-arc welding broadens its applications....Mar. 25 *92
Jones, James. The process engineer's place in industry....Jan. 1—160
Jones, J. W. Careful storage reduces cutter costs....Nov. 18 *115
Juckett, E. E. How safety adds to profits May 20—108

KAASHOEK, JOHN. Adding odd fractional dimensions....July 29—104
Kasper, L. Fixture locates blind holes.. May 20 *120
Retracting pins align setup....June 17 *130
Kaufman, Harry. Back up or back out? Aug. 12—178
Boss—and bust?....Sept. 9—179
Coddle or cull?....Jan. 29—334
Deadline or dead time?....Oct. 21—164
Do morals affect morale?....Oct. 7—179
Does a raise raise output?....May 6—169
Ease in or break in?....July 1—154
Expert or executive?....June 3—167
Foreman or reformin'?....Nov. 4—172
Gambling on the long green....Nov. 18—182
Guards or protection?....June 17—172
Is blue Monday inevitable?....Aug. 26—152
Is too good too bad?....July 15—162
Learn or earn?....Feb. 26—160
Present or bribe?....Sept. 23—180
Prospecting....Nov. 4—178
Rating or ratting?....Jan. 1—152
Should suggestions be screened?.Sept. 23—172
Single-track or double-track mind?.Oct. 7—174
Step down or step out?....Mar. 25—164
Study it or do it?....Jan. 15—166
Swapping shops....July 1—163
Too good....Dec. 2—158
Who hires the boss?....July 29—154
Keating, James. Washer holds stud in small hole....Apr. 8 *125

(*) Illustrated (ed) Editorial

Keiffer, L. R. & C. L. Amick. Test your own fluorescents.....July 29 *80
Keller, Fritz L. Jig locating pilot speeds work and reduces breakage of drills Apr. 22 *98
Kelsey, Robert H. Milling table stops aligns work.....Mar. 25 *117
Kennedy, Clifford W. Is statistical quality control of value in manufacturing? Sept. 9— 87
Kent, Thomas. Seamwelding a tension mandrel simplifies tube joining....Oct. 7 *122
Kettle, Arthur B. Sales procedure—the written word.....Aug. 12—140
Klein, Seth C. Aircraft fixture makes trolley-coach assemblies.....Sept. 9 *88
Knotek, Robert. Rating or ratting?..Jan. 1—154
Kocinski, J. J. Positioning block locates keyways.....Apr. 22 *96
Kronenberg, M. Tool angles govern cutting efficiency.....Jan. 15 *90
Kunze, Karl R. & Lee Stockford. How family status affects vocational adjustment.....Oct. 7 *85

LALAK, GEORGE. Planer makes helical cuts.....Jan. 15 *93
Lamp, Robert J. Lathe spider supports cylinder while counterbore work is done.....Apr. 8 *123
Landauer, Heinze M. Aluminum stock drives center.....Aug. 12 *129
Lawson, Harold & G. F. Daschke. How Packard whips tough forging jobs July 29 *73
Lay, Edward. Motor brushes finished to size by milling and lapping fixture..May 6 *125
Laycock, W. Setup box holds flat parts Feb. 26 *118
Lazzara, Vincent S. Centrifugal process improves investment castings..Aug. 26 *93
Lees, S. Broach grip protects hands..June 17 *126
Le Grand, Rupert. Air-powered devices increase machine output.....Mar. 25 *88
Dodge rolls threads on screw machines Dec. 2 *94
Ford handles by automation.....Oct. 21 *107
How would you recondition a 10x20 ft. surface plate?.....Nov. 4 *92
Ingenious equipment modifications increase production.....June 3 *90
Navy devises ingenious planer and boring-mill setups.....Oct. 7 *96
Work loaders applied to machine tools Mar. 11 *149-172
Lettino, Fred. Fixture on drill tests springs by deflection check on samples..Apr. 22 *97
Levowich, Bernard. Alarm clock starts plating-tank heat.....Dec. 30 *115
Angle irons clamp stock in jaw..July 1 *114
Plastic strip improves shears..Aug. 26 *112
Lewis, O. Step down or step out?..July 15—160
Lewis, W. Turret-lathe attachment produces cams with roller and tool holder.....Aug. 12 *129
Linsley, H. E. Adhesives for metalworking Feb. 12 *107
Align honing eliminates bearing scraping.....Jan. 15 *88
Assembly conveyors increase food-mixer production.....Dec. 2 *92
Creating a kodak.....Oct. 21 *98
Fundamentals of cold heading..Apr. 8 *99
How to handle lignum-vitae....June 17 *122
How to paint the product..pt. 1 July 15 *97; pt. 2 July 29 *89
Lovejoy, Frank. Toolholder handles double duty.....Oct. 21 *127
Lovejoy, Stanley. Precision taps flute-sharpened for close tolerances....Mar. 11 *133
Lovering, E. W. & others. How to finish copper and copper alloys.....Feb. 26 *95
Lucht, Fred W. Carbide drills.....June 3 *133
Lurz, Frederick C. Headstock bearings in old lathe replaced in shell-reaming setup.....July 29 *111
Milling machine cuts slotted cams using removable fixtures on table....Apr. 8 *121
Milling machine handles turning with swing too large for lathe....Apr. 22 *95
Stubby boring-tool holder backs up heavy cuts rigidly.....Aug. 26 *111
Lynch, J. W. Continuous bonderizing doubles output.....June 3 *87
Lyon, Albert E. Swapping shops?....July 1—163

MacCREHAN, PROF. W. A., JR. How to treat a gage.....Dec. 16 *116
MacDonald, E. B. The technique of a sales engineering interview.....Aug. 12—143
Mackinnon, C. D. Back up or back out? Oct. 21—180
Does a raise raise output?....Aug. 26—146
Ease in or break in?.....Sept. 9—177
Guards or production?.....July 29—148
Is blue Monday inevitable?.....Nov. 4—166
Learn or earn?.....June 17—170
Rating or ratting?.....June 3—162
Sheet metal held flat in telescoping vise insert.....Jan. 1 *105
Slotter forms thread-like cuts as crank positions unusual job.....May 6 *123
Step down or step out?.....July 15—158
Swapping shops.....Oct. 7—170
Tapered flat on boring-bar arbor guides boring tool in liner.....Oct. 7 *120
Trouble shooter or trouble maker? May 20—158
Mackinnan, W. D. Friend—or foreman? Feb. 26—168
Vacation—a loaf or a leave?..Feb. 26—156
MacLeod, Neil. Worn gears gashed and hobbed on large gap-type engine lathe Feb. 12 *132
MacNeal, Allen. Grooves cut in blind bore with a special lathe tool.....Feb. 12 *134
Malmgren, Nels A. Auxiliary vise clamp prevents slipping during heavy cuts Jan. 1 *107
Steadyrest controls cut-off on lathe with loose bearings.....Feb. 12 *129
Manius, Joe. Arbor press precision taps. Oct. 7* 123
Attached mechanism loads balls in predetermined lot numbers.....Apr. 8 *122
Multiple drillhead machines single-hole parts in gangs.....May 20—118
Mansberger, Burl W. Lathe and rrillpress combined reduces handling..Jan. 15 *122
Rise on cams is turned in lathe with templet-and-follower setup....May 20 *119
Marek, Glenn. Computor simplifies alignment of couplings.....Dec. 2 *74
Marks, A. W. & H. L. Hovis. Bright hardening and tempering tiny parts. pt. 1 Feb. 12 *91; pt. 2 Feb. 26 *112
Marsteller, Charles H. Double spindle strengthens gage for use with large layout work.....Apr. 8 *125
Martin, H. B. Face-to-face or back-to-back Dec. 2—152
Present or bribe?.....Sept. 23—178
Prospecting .....Nov. 4—178
Martin, Irl C. An unusual management philosophy .....June 17 *119
Martin, Louis D. Gear measurement over non-standard pins.....June 3—109
Prbolems in shaving fine-pitch gears Dec. 16 *84
Mastache, L. J. Eyes are your most valuabel machines .....June 17 *107
Mather, Daniel L. Tooth rest made universal by adjustable ball joint.....July 15 *128
Matter, James K.:
Boss or bust?.....Aug. 12—186
Do morals affect morale?.....Sept. 9—187
Guards or production?.....Mar. 25—166
Present or bribe?.....Sept. 23—182
Quitting time or washup time?..Aug. 12—117
Should suggestions be screened? Aug. 26—158
Who hires the boss?.....July 15—168
Mattson, Gosta. Shaft-drilling V-block Jan. 1 *106
Maurer, George P. How large gears are shaved .....Dec. 16 *90
Mawson, Robert. Six hex-heads milled in three passes with indexing table Jan. 1 *106
Maxwell, Alexander. Spiral blade silver soldered in standard butt-weld machine Sept. 9 *126
May, John M. Back up or back out? Aug. 12—182
Blue devils.....Oct. 7—183
Deadline or dead time?.....Aug. 12—187
Do morals affect morale?.....Oct. 7—177
Ease in or break in?.....Apr. 22—151
Expert or executive?.....Femb. 12—174
Is too good too bad?.....Apr. 8—172
Learn or earn?.....Jan. 29—348
Should suggestions be screened? Aug. 26—156
Too good.....Dec. 2—154
May, Rex, Jr. Spining lathe doesn't stop Dec. 2 *104
Mazer, William S. Cloth patch with large drill improves holes in thin stock July 29 *111
McCarroll, R. H. (interview) Process control corrects faulty methods.....June 3 *112
McCrea, A. B. Shop carts carry all the tools June 17 *110
McGar, B. H. & others. How to finish copper and copper alloys.....Feb. 26 *95
McGuinness, Joseph J. Compound die cuts off, forms, curls.....May 20 *106
Machining copper and its alloys May 6 *101-112
McKay, K. R. Special lathes turn tapers Aug. 26 *102
McKay, W. G. Tapping stud cleans holes Dec. 30 *115
McLane, Frank E. Yellow light reduces glare .....Aug. 12—127
Melnitsky, Benjamin. Handling economy at power saws.....Jan. 1 *74
Menkin, Burnett. Slotter strap feed stop both horizontally and vertically Apr. 22 *100
Mikkelsen, Edward M. Learn or earn Feb. 26—164
Milewski, Walter. Ball-turning lathe attachment cuts hand feed, raises speed. June 17 *129
Miller, Bryan D. Is statistical quality control of value in manufacturing? Sept. 9 —86
Miller, Dr. Emery P. Hangers for electrostatic painting..pts. 1 & 2 Aug. 12 *151 pts. 3 & 4 Sept. 23 *147
Miller, J. F. Compact chute rack stores motor frames.....June 17 *102
Meeting objections.....Aug. 12—145
Mills, Richard E. Tapping clutch prevents jams .....Aug. 26 *109
Turret hookup reduces load on small threading diehead.....Aug. 12 *130
Mills, Wallace C. How to reduce costs of thin metal stampings.....June 3 *99
Milner, G. R. Adjustable grinding segments maintain constant diameter....Dec. 2 *102
Bar-type reamer cuts smooth bore using hardened circular cutters....May 20 *116
Goose-neck cutter planes curved surfaces Nov. 18 *128
Ice tongs hoist heavy loads.....Dec. 16 *124
Razor-blade tool finishes lead..Nov. 4 *123
Rubber pads cushion gang milling setup on arbor extension.....Oct. 21 *127
Serrated, tapered shaft produced by tool held in lathe turret.....June 3 *118
Staggered quintet of boring bits rough and finish pump-body holes....Sept. 23 *131
Miner, Ralph A. Gear measurement over non-standard pins.....June 3—109
Moffatt, John J. Drilled-block feed cools cutoff .....Feb. 26 *117
Drilled block fitted on lathe to wind coil springs on arbor.....May 20 *116
Moore, D. Milling setup slips under spring to help cutter around die corner July 29 *109
Moore, H. Angle-plate setup speeded by work-aligning attachment.....June 17 *129
Chuck device set in T-slot locates center punched stock.....Aug. 26 *109
Fixture holds pins for milling..Apr. 8 *125
Jig guides align small drill....Sept. 23 *134
Quick-acting fixture closes jig with pressure on collar handles.....Feb. 26 *120
Saw-tooth jig aligns drill for machining out slats.....Sept. 9 *127
Shaft positioned for drilling....Feb. 12 *134
V-tapered rollers center bars for punching .....Oct. 21 *130
Wheel fixture gages tapers....Dec. 16 *120
Morgan, C. H. Carbides speed copper machining .....Oct. 21 *102
Morgan, C. R. Threads rolled in screw machines .....July 15 *116
Morgan, E. K. Typical situation employing general-purpose machine tools..Aug. 12—136
Morton, Arthur. Openside toolholder allows closer facing and turning.....Jan. 1 *104
Mulholland, Dan J. Four way tool-holding turret cuts engine-lathe time for small lots .....July 1 *114
Murphy, J. Morals or morale?.....Aug. 26—160
Should suggestions be screened? Aug. 26—156
Murphy, M. Present or bribe?....Sept. 23—184
Murray, A. F. Mechanizing cleaner manufacture ups output, saves floor space May 20 *110
Murray, A. M. Tubes keep ball bearing clean .....July 1 *102
Muscato, Charles. Tap locator halts breakage .....July 29 *109

NAGLE, HAROLD E. Precision dies draw brass lock parts.....Dec. 30 *74
Precision dies mass-produce die-castings Dec. 16 *77
Naidish, Norman L. Cutoff saw in surface ground to reduce thickness of edge June 3 *122
Gambling on the long green....Oct. 21—190
Nesin, William Z. Small punch draws deep shell .....June 3 *119
Neumann, John. Milling way holder for rods replaces height gage setups June 3 *119
Nielsen, Dr. R. A. Induction speeds production .....Nov. 18 *112
Nippes, A. S. Sharpening broach sections Nov. 4 *121
Nivers, Albert. Adjustable-angle toolholder positions worm-turning tool..Sept. 23 *133
Nixon, Allen B. Adjustable steadyrest eliminates taper in cylindrical-ground work Mar. 11 *187
Bull center grips end of stock for cutting collars from tube.....May 20 *119
Cam-clamping V-block fixture holds bar stock for machining.....Aug. 26 *111
Drill shank holds centerdrill for rapid tail-stock assembly.....Apr. 8 *126
Fixture regulates wheel dresser for accurate radius and arc cuts....Apr. 22 *96
Holder positions dies straight for serial numbers and letters.....May 6 *123
Knurled cam and rack built into quick-acting machine-shop vise....June 17 *128
Precision centering fixture sets up cylindrical grinds.....Dec. 16 *120
Radius-cutting lathe tool mounted on toolset .....Nov. 4 *120
Scale blocks speed shaft layout..Mar. 25 *118
Soldered-brass chuck jaws protect finished pieces.....Jan. 15 *122
Spacers back up turning work to support small, thin stock.....Apr. 22 *98
Spherical-turning lathe tool cuts precision ball and socket elements Jan. 15 *119
Spindle stop turns engine lathe into production cutoff machine....Feb. 26 *122
Norgen, Carl A. Profit sharing can work in a free-enterprise system.....Mar. 25 *83

(*) Illustrated (ed) Editorial

ODELL, EVERETT. Accurate multiple threads cut by using vernier on compound .....Apr. 22—100
May 6 *125
O'Leary, Daniel. Check spring lifts shaper tool, protects work on return stroke
July 15 *128
Olson, David. Concentricity to a tenth
July 15 *123
Oshinsly, Theodore. Double-gear screw machine tool turns external radius on shaft .....June 17 *127
Progressive die scores, trims and forms heavy shell.....Sept. 9 *85
Owen, John L. How Hamilton hires..Nov. 4 *85

PATTAS, LEO J. Precise processing produces flatirons faster.....Nov. 4 *98
Paquin, J. R. Pilots for progressive dies
May 20 *127
Side-cutting shape tool clips wire lengths in gaging fixture.....July 1 *116
Parks, Charles H. Planned lubrication cuts maintenance costs.....Oct. 21 *104
Parkes, R. Gear measurement over non-standard pins .....June 3—110
Pasco, F. M. Should suggestions be screened?
Sept. 9—180
Patell, Thomas. Reverse reamer transfers holes .....Nov. 18 *127
Patterson, Wm. F. Why do apprentices quit?
Aug. 26— 80
Payne, Burton R., Jr. & P. A. Hawthorne. Rapid determination of carbon content in steels .....Nov. 18 *124
Pearson, S. H. Roller-grip pneumatic attachment feeds strip stock to punch press
July 29 *108
Peets, W. J. What does the buyer want?
Aug. 12—138
Permini, Dominick. Lock-washer stop really stops .....Dec. 16 *123
Phillips, Chandler A. Ammeter load gage indicates condition of tool....Dec. 16 *121
Vise changes expand utility....Oct. 7 *122
Phillips, Larry. How to weld die castings
Dec. 2 *72
Pilarczyk, D. J. Broken center drills
Jan. 15 *122
Powell, J. E. Are toolmakers obsolescent?
Jan. 1—148
Back up or back out?.....Oct. 7—172
Deadline or dead time?.....Dec. 2—146
Does a raise raise output?....Aug. 26—146
Ease in or break in?.....Sept. 9—175
Excuse or excellence?.....June 3—162
Expert or executive?.....July 1—150
Friend or foreman?.....May 20—158
Guard or production.....Aug. 12—172
Learn or earn?.....June 17—170
Piecework in the toolroom.....Jan. 15—162
Rating or ratting?.....July 15—158
Step down or step out.....July 29—146
Swapping shops.....Sept. 23—188
Trouble shooter or trouble maker?
May 6—164
Vacation—a loaf or a leave?..Apr. 22—142
Pranses, A. L. Better steel devised for hubbing .....July 29 *84
Carbide inserts rejuvenate plastic transfer molds.....June 17 *95

QUIST, W. W. Swing stops locate short jobs .....Oct. 7 *124

RANTSCH, EDWARD. Difference in tool point widths for worm job on mill and lathe.....Mar. 11 *186
Gear measurement over non-standard pins
Jan. 29 *101
Rasmussen, Henry. Boss . . . and bust?
Aug. 26—152
Expert or executive?.....Jan. 29—342
Extended screw improves clamps Feb. 26 *119
Extended telescopic gage handles large dimensions and diameters....Mar. 11 *186
Face-to-face—or back to back? Dec. 2—150
Good morning to you.....Dec. 16—171
Rasmussen, J. H. Is blue Monday inevitable?
Aug. 12—184
Raterman, Jerome A. Analyzing failure
Aug. 12—146
Raymemt, A. D. Clapper-box side play halted by brass screws.....Dec. 16 *121
Ream, Gordon A. Guard strengthens welder shunt .....Apr. 8 *124
Redl, Paul. Lathe mount drives gas torch
Nov. 4 *123
Redmayne, R. G. Boring tool cuts accurate holes .....July 29 *112
Reich, J. J. Hacksaw fixture clamps bars
Sept. 9 *126
Job-lot chimney hands produced with economical tooling methods..Sept. 9 *125
Reimschissel, C. A. Dieheads will turn, form and groove.....Oct. 7 *92
Remacle, Gustave. Duplicate punch and die taper cut by backhand boring system
July 1 *113
Old shape sets up new block for shaping job .....Dec. 30 *116
Oscillating stop positions stock for punch-press blanking operation....Aug. 12 *128
Richey, S. E. Reversed shaper tool doesn't dig in.....Dec. 30 *116
Ricker, Chester S. Automatic machines speed truck-axle production.....Jan. 15 *94
Cold heading cuts manufacturing costs
Feb. 26 *89
Drilling kinks cut machine downtime
Apr. 22 *94
Dynaflow rotors cast in plaster molds
Nov. 18 *120
Ford's radical radiator production line
July 1 *77
Gravity flow from tank builds up pressure ahead of nozzle.....Nov. 4 *122
How Buick builds the Dynaflow..Oct. 21 *91
How Buick makes dynaflow brakes tough .....Oct. 7 *118
Pad-spreading fixture speeds brake-pedal assembly for autos.....July 15 *125
Pistons and con rods machine-assembled
Apr. 8 *111
Pneumatic muscles clamp and assemble
June 17 *112
Process control corrects faulty methods
June 3 *112
Riggio, Peter. Caliper device locates radius of layout concentric with hole May 6 *125
Roberts, Ralph E. Production grinding Alnico rotors.....Aug. 12 *94
Roos, Delmar G. How the jeep donned civvies .....Jan. 1 *69
Rowan, Miles J. How materials handling affects plant lyaout.....Dec. 30 *83
Rudel, Thomas R. What does it cost to sell?
Aug. 12—143
Rudolph, Walter. Drill jigs speed output of stove burners .....Feb. 12 *124
Fixtures aid work handling....May 20 *96
Precision welding jigs simplify stove assembly .....July 1 *82
Shop shots at Lord Mfg. Co.....Mar. 25 *96
Rudolphson, R. T. Heaters help accuracy of boring machine.....July 15 *96
Rundt, J. W. Offset boring head saves time when taper turning with lathe Feb. 12 *129
Russell, Grover C. Drillpress heads bored in miller with fly cutter and shell reamer.
Aug. 26 *108
Ryder, George. Steel wool removes small burrs. .....Oct. 7 *121

SAGLE, LAWRENCE W. B&O says it's "on time" with machinery replacement program.....Dec. 2 *70
Locomotive flue tubes cleaned automatically .....May 20 *102
Sargeant, E. V. Pressure to pierce sheet steel. pts. 1 & 2.....Jan. 15 *139
Sawin, Prof. Dr. Ing. N. N. Wear resistance measured in laboratory and shop
May 20 *98
Scala, H. Drill ground with pilot works soft sheets.....Oct. 21 *128
Drillpress grinds slitting saw..May 20 *119
Schacht, Fred H. Guards or production?
Mar. 25—170
Schlage, Ernest L. How to turn non-standard threads .....Feb. 12 *95
Schlesinger, William A. Marine-engine linkage edge-ground with track-and-trolley positioner .....July 15 *125
Schmidbauer, Hans. Angle iron jig checks pipe joints.....Mar. 11 *187
Edge-to-edge measuring method gives center distance of holes.....Mar. 11 *185
Gage finds center of bar stock..Apr. 22 *95
Punch holder locates large holes..Feb. 26 *118
Removing bushings in blind holes Apr. 8—126
Schwartz, Charles. Air gun ejects thin shells .....Nov. 4 *123
Scoblic, A. F. Coddle or cull?.....Feb. 12—172
Learn or earn?.....Jan. 29—342
Rubber jaws hold many pieces Jan. 1 *105
Scooneas, F. W. Barrel switch solves conveyor problem.....June 3 *108
Scott, C. C. Sapphire tip bores bushing
July 29 *83
Scriber, F. H. Grouped parts multiple-machined .....Apr. 8 *90
Split collet and beveled pins hold lathe work fore and aft.....July 1 *115
Universal mounting holds work at odd angles for machining.....Apr. 22 *96
Sdano, Jess. How to machine vitallium
Nov. 18 *96
Shafer, Jack. Practical inspection lowers scrap and rework.....Dec. 16 *112
Shank, Carl. Ingenious tooling cuts sheave costs .....Mar. 11 *178
Shopbell, Glen. Bell ringer cuts die rubber
May 6 *127
Internal recess cut in cylinder checked by use of flush-pin gage.....May 20 *117
Low-pressure air line operates cylinder through simple valve.....Aug. 12 *130
Magazine fixture feeds parts automatically into tapping position....July 15 *127
Shope, Charles. Adapter for sharp-V and American standard checks diameters
Oct. 21 *126
Toolpost slipper clears chips....Oct. 21 *130
Shortell, Thomas M. Wing bolt clamps drill pad .....Nov. 4 *124
Shum, Aaron H. & S. E. Eklund. Simplified machniing produces complicated parts .....Dec. 2 *96
Silvester, Arthur. Back up or back out?
Aug. 12—176
Coddle or cull?.....Jan. 29—336
Deadline or dead time?.....Aug. 12—186
Does a raise raise output?....June 17—180
Ease in or break in?.....July 1—158
Expert or executive?.....June 3—167
Foreman or reformin'.....Dec. 2—148
Gambling on the long green....Nov. 4—176
Guards or production?.....Apr. 22—146
Is blue Monday inevitable?.....Oct. 7—174
Is too good too bad?.....May 6—168
Learn or earn.....Feb. 26—164
Should suggestions be screened?..Nov. 4—170
Single track or double-track mind?
Oct. 21—18t
Present or bribe?.....Nov. 18—180
Prospecting .....Dec. 16—168
Step down or step out?.....May 20—162
Study it or do it?.....Jan. 15—174
Swapping shops.....July 15—164
Too good.....Dec. 2—154
Trouble shooter or trouble maker?
Feb. 12—170
Who hires the boss?.....July 29—156
Simon, E. & F. W. Thomas. Brush anodic films onto local areas.....July 1 *103
Sinisi, A. A. Is that square square? May 20 *120
Skiba, Ray & B. H. Griffith, Jr. How to design work coils for induction heating
Aug. 12 *99
Smele, W. Small cutter deburrs blind edges
Sept. 23 *134
Smith, Harry. Pivoting indicator tool checks vertical angles.....Oct. 21 *129
Smith, J. E. Back up or back out? Aug. 12—182
Smith, John K. Datum plate locates keyways.
Oct. 21 *127
Snedden, J. T. Continuous press foundations simplify layout changes.....Dec. 30 *71
Solakain, Haig. Heat-treating principles and their application to salt baths. pt. 1 Apr. 8 *96 pt.; 2 Apr. 22 *90; pt. 3 May 6 *118
Sorenson, Chris. Ammonium sulphide aids layout .....July 15—127
Block gage centers jig borer over work edge to locate holes.....Apr. 8 *124
Block helps to center cutter over shaft for keyway milling.....Apr. 22 *97
Chuck jaws ground true.....June 17 *130
Milling machine jig bores with accurate measurement.....June 3 *119
Pin stop locates, ejects stock with spring-loaded mechanism.....Mar. 6 *125
Spinks, Hugh F. Drill sleeves confines whipping .....Oct. 21 *129
Spollen, Francis. Drill jig fits on V-block
July 1 *113
Springle, L. A. Auxiliary slanted vise jaw holds casting with draft.....Aug. 26 *110
Sredenschek, W. A. How the machine tool salesman looks to the buyer..Aug. 12—136
Stanford, Rolland. Shims check chuck shaving .....June 17—126
Stanley, Samuel. Handicapped vets handle job normally in production....Sept. 9 *114
Staub, Chas. R. Stock allowance for gear finishing .....Sept. 23 *145
Stebbins, F. H. Deadline or dead time?
Aug. 12—184
Does a raise raise output?....Apr. 22—148
Gambling on the long green....Nov. 4—174
Guards or production?.....Mar. 11—240
Present or bribe?.....Sept. 23—178
Prospecting .....Dec. 16—167
Should suggestions be screened? Sept. 9—181
Study it or do it?.....Jan. 15—172
Trouble shooter or trouble maker?
Jan. 15—162
Steenberger, William A. Self-reversing clutch plate drives bench tapping spindle .....Sept. 23 *131
Steiner, Alois. Boring-bar holder on compound handles drilling and threading
Aug. 12 *129
Pipe and angle-iron bandsaw driven from engine-lathe head.....Aug. 26 *110
Stern, Harry. Drill press grinds flat surfaces .....Mar. 11 *186
Drillpress set-up grinds radii on cutting tools and toolbits.....May 6 *127
Large panels drilled with press mounted on drill stand and plate.....Mar. 25 *118
Small, thin drill locates holes to critical layout tolerances.....Feb. 26 *120
Splines cut by set of broaches using single progressive edges....Mar. 25 *120
Stevens, W. D. Steam fitting turned accurately with ball-and-sockets spacer bar
Sept. 9 *128
Stockford, Lee & K. R. Kunze. How family status affects vocational adjustment
Oct. 7 *85
Stran, Herbert A. Adapter plate and punch used for pre-notching.....May 6 *126
Strasser, Frederico. Broken die supported in block makes replacement unnecessary
Apr. 8 *126

(*) Illustrated (ed) Editorial

Button holders solve "impossible" layout problems ..... Jan. 1 *103
European punch guides simplify die making ..... Nov. 18 *130
Lathe work remounted in chuck July 1—116
Punch design reduces stresses for blanking and perforating.... May 6 *127
Ram ejects plastic parts..... Dec. 2 *103
Rectangular hole formed in block using only common machine tools.... Apr. 22 *97
Thread depth checked on lathe with sharply pointed toolbit..... July 15 *127
Stryker, Raymond K. Old short twist drills make good counterbores..... Jan. 1 *106
Stull, Lowell F. Arms hold irregular drill work. ..... Feb. 26 *119
Shift bar controls action of floating punches ..... Dec. 30 *115
Stump, Elgani. Breaks cut by magnetizing drills ..... June 17—127
Sumslo, Stanley. Double saw doubles cutoff June 3 *121
Sussman, Milton E. Do morals affect morale? Sept. 9—186
Ease in or break in?..... May 20—170
Face-to-face—or back-to-back?.. Dec. 2—152
Gambling on the long green.... Oct. 7—184
Good morning to you..... Dec. 16—169
Guards or production..... Apr. 8—166
Suverkrop, Lew. Keep your dividing head in trim..... Aug. 12—124
Sweet, Donald E. Mathematical shortcut for computing coordinates..... Feb. 26 *115
Tabulated constants for pulleys found with form-tool mathematics.. Nov. 18 *129

TANGERMAN, E. J. Are you in Sleepy Hollow? ..... Jan. 15 *85
Damped quill stops self-excited chatter May 6 *93
Tooling techniques at Presteel.. June 17 *91
Tarasov, L. P. How to prevent gear-grinding troubles ..... pt. 1 Sept. 9 *116
pt. 2 Sept. 23 *104
Taylor, C. Rotary table grooves tube form Nov. 18 *129
Thomas, F. W. & E. Simon. Brush Anodic films onto local areas..... July 1 *103
Thompson, K. W. Tapered thread cut with bar and roller..... Oct. 21 *126
Tibbits, Don J. W. Sample taper job gages turning of new part to identical taper Mar. 25 *118
Tigges, Herbert L. A survey of machine tool buyers..... Aug. 12—140
Tingley, Lester. Resistance welder makes cutoff machine..... Aug. 12 *120
Townsend, Chas. D. Back up or back out? Oct. 21—178
Boss . . . and bust?..... Nov. 4—168
Coddle or cull?..... June 3—165
Do morals affect morale?..... Oct. 7—180
Does a divvy now mean a dole later? Mar. 11—232
Does a raise raise output?..... June 17—178
Ease in or break in?..... July 1—160
Sept. 9—176
Guards or production?..... Mar. 5—168
Learn or earn?..... Feb. 26—158
Move men up or in?..... Jan. 1—146
Rating or ratting..... Oct. 7—168
Step down or step out?..... May 6—164
May 20—164
Study or do it?..... Apr. 8—164
Trouble shooter or trouble maker? Apr. 22—142
Trospect, R. E. Four types of stud removers get into those tight quarters.. Mar. 11 *184
Memories, memories..... May 20 *93
Tyler, Joseph V. Fixture clamps clutch bolts for grinding radius..... Oct. 7 *123
Tyler, T. E. New welding arm spots holding strips ..... Dec. 16 *122

VALENTINE, K. C. Wood block groups small tools with die identification label Mar. 25 *120
Van Voast, James. Hyperbolic roller planed —theory and discussion..... July 15 *127
Vernon, E. R. Toolslide set at angle makes accurate turning and boring.... June 3 *118
Victory, Frederick C. Dimensional instability affects design of precision equipment. pt. 1 Feb. 26 *108; pt. 2 Mar. 11 *144; pt. 3 Mar. 25 *112; pt. 4 Apr. 8 *112
Vidinghoff, R. A. The sales engineer's daily activity ..... Aug. 12—145
Villard, Joseph L. Vibrator loosens chips Jan. 15 *124
Vlack, George. Process sheet for calorizing steel ..... Nov. 4—135
Voss, Edward W. Handling sales to multi-plant customers..... Aug. 12—146

WAECH, RALPH R. Automatic lathe mechanism faces work with rough and finish cuts ..... Aug. 12 *126
Clamping fixture holds bearing shell for oil-groove machining..... Oct. 7 *124
Valve driver controls lapping.. June 17 *127
Wagner, A. Boring bar cuts internal sphere with link-driven rotating tool May 6 *127
Wakefield, John E. Metallizing failures to avoid ..... Sept. 23 *100
Walker, Edgar E. Socket ratchet twists tap wrench ..... Mar. 25 *122
Ware, R. B. Kurled rings hold drill job June 17 *129
Warner, Harold G. What information should the sales engineer give the customer? Aug. 12 *137
Warner, W. E. Friend or foreman? May 20—158
Warner, W. L. Expert or executive? July 29—146
Wasser, Paul E. Templet-indicator setup planes brake dies from precut sample July 1 *113
Waychoff, A. H. Short cuts for the small shop Jan. 1 *76; Jan. 15 *89; Feb. 12 *128; Feb. 26 *107; Mar. 11 *182; Mar. 25— 87; Apr. 8 *115; Apr. 22 *73; May 6 *95; June 3 *115; June 17 *123; July 1 *105; July 15 *115; Sept. 9 *96; Sept. 23 *110; Nov. 4 *97; Dec. 2 *99; Dec. 16 *93 Oct. 7 *94; Nov. 4 *97; Dec. 2 *99; Dec. 16 *93
Weaver, J. R. The effect of quantity on machine selection..... Aug. 12—141
Webber, H. M. Furnace-brazed assemblies replace one-piece units..... Sept. 9 *92
Webster, F. Minute hole drilled in block by squeezing metal around wire.. June 3 *122
Weirstall, E. J. Jigs and fixtures at low cost ..... Sept. 23 *126
Weiser, C. H. Do morals affect morale? Oct. 7—178
Wenke, Gerhard. Extra vise jaws hold small work ..... Mar. 25 *122
Werner, George. Converted grinder forms arcs to finish bearing cap surface May 20 *117
Makeshift micrometer for large work is built from discarded snap gage Apr. 8 *123
Wessinger, B. E. Expert or executive? Feb. 26—168
Wetzel, Peter. Study it or do it?.... July 15—172
Wharen, Harry S. Broach-tap cuts quintuple threads ..... Apr. 22 *69
Curved chutes aid work ejection Apr. 8 *88
Mechanized handling eases wheel manufacture ..... Feb. 26 *84
Planned tooling whittles costs Mar. 11 *140
Small plants gain big-plant economies May 20 *94
Wheatley, U. Shaper cuts rack in sections Mar. 11 *185
Whinrey, R. E. Air fixtures ease machining and assembly..... July 15 *92
Small chip-handling department serves twenty-two automatics..... July 29 *106
White, R. H. Chuck-jaw inserts cut scrap pile and improve quality of production Sept. 23 *132
Wieschhaus, L. J. Blast cleaning prepares surfaces for finishing..... Sept. 9 *81
Willey, Charles H. Cut-out bench vise clamps round stock and weld work.... July 29 *110
Small hubs cut off and drilled with watchmaker's bench lathe.... June 3 *120
Small lever bent in fixture.... May 20 *119
Studs tapped in plate fixture.... June 3 *122
Wilson, George W. Auto wheel replaces shaper crank for faster, smoother traversing ..... Mar. 25 *117
Dog clamps end of work..... July 1 *113
Toolholder tackles heavy cuts.... Nov. 4 *121
Winjum, Orel R. How to evaluate supervisory jobs ..... Aug. 26 *81
Wretley, Orton S. Socket head forms box wrench ..... Nov. 4 *124
Wyleta, A. F., Jr. Steel balls as centers improve offset tailstock taper turning Jan. 15 *120

YARROW, H. Accuracy in indicating shaft improved with thin steel leaf Aug. 26 *108
Yates, T. Bearing steadies drill grinding Mar. 11 *185
Youtz, D. E. Automare..... Jan. 29—352

ZARNOWSKI, FRANK J. Back up or back out?..... July 29—158
Blue devils..... Oct. 7—183
Do morals affect morale?..... Sept. 23—176
Does a raise raise output?.... Apr. 22—150
Ease in or break in?..... May 20—166
Guards or production?..... Mar. 25—170
Is too good too bad?..... Apr. 8—168
Manual "armbreaker" turning grooves tube-bending forms..... Sept. 9 *124
Present or bribe?..... Sept. 23—186
Prospecting ..... Dec. 16—166
Should suggestions be screened? Sept. 9—181
Single track or double track mind? Sept. 9—183
Swapping shops?..... July 1—164
Who hires the boss?..... July 15—170
Ziemke, D. P. Motors rewired for new voltages ..... Mar. 11 *188
Zino, Anthony J., Jr. What to look for in hydraulic oils..... pt. 5 Jan. 1 *96
pt. 7 Feb. 12 *126
Zurlo, John T. Engine-mounted hand turner trues up damaged crank pins June 17 *128
Grinder mounted on shaper ram sharpens teeth on circular saw..... Mar. 11 *193